OPERATOR'S MANUAL

HydroCut Series

Transaxle Drive Walk-Behind Mower

Model Number:	Description
5900111	HC36KAV13E, 13HP, 32" Cut Walk-behind Mower
5900604	HC32KAV13E, 13HP, 32" Cut Walk-behind Mower
5901037	HC32KAV13, 13HP, 32" Cut Walk-behind Mower

Ferris Industries
5375 North Main Street
Munnsville, NY 13409
800-933-6175

5100784
Rev. No. 01
Rev. Date: 9/2006
TP 100-7303-01-HC-F

Thank you for purchasing this quality-built Ferris product. We're pleased that you've placed your confidence in the Ferris brand. When operated and maintained according to the instructions in this manual, your Ferris product will provide many years of dependable service.

This manual contains safety information to make you aware of the hazards and risks associated with this machine and how to avoid them. This machine is designed and intended to be used and maintained according to the manual and operated by trained professionals for finish cutting of established lawns and is not intended for any other purpose. It is important that you read and understand these instructions thoroughly before attempting to start or operate this equipment

PRODUCT REFERENCE DATA	
Unit Model Number	Unit SERIAL Number
Mower Deck Model Number	Mower Deck SERIAL Number
Dealer Name	Date Purchased
ENGINE REFERENCE DATA	
Engine Make	Engine Model
Engine Type/Spec.	Engine Code/Serial Number

See Page 10 for the location of Identification Numbers

DATE PURCHASED

⚠ WARNING

Engine exhaust from this product contains chemicals known, in certain quantities, to cause cancer, birth defects, or other reproductive harm.

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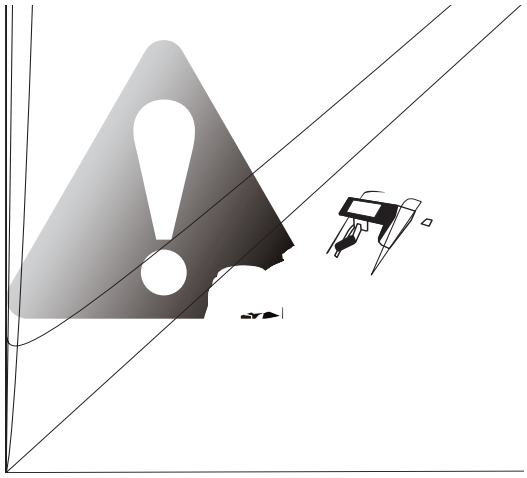
NOTE: In this manual, "left" and "right" are referred to as seen from the operating position.



Operating Safety

Congratulations on purchasing a superior-quality piece of lawn and garden equipment. Our products are designed and manufactured to meet or exceed all industry standards for safety.

Do not operate this machine unless you have been trained. Reading and understanding this operator's manual is a way to train yourself.

Power equipment is only as safe as the operator. If it is misused, or not properly maintained, it can be dangerous! Remember, you are responsible for your safety and that of those around you.

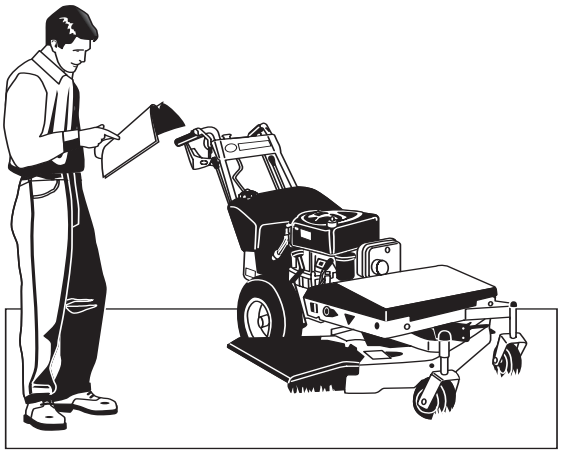
Use common sense, and think through what you are doing. If you are not sure that the task you are about to perform can be safely done with the equipment you have chosen, ask a professional: contact your local authorized dealer.

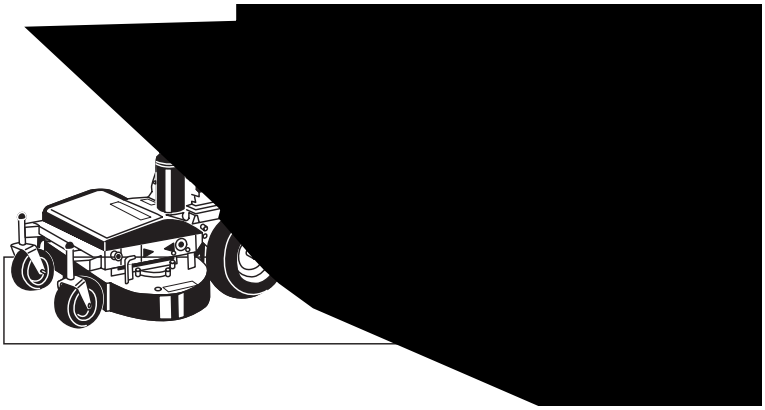
Read the Manual

The operator's manual contains important safety information you need to be aware of BEFORE you operate your unit as well as DURING operation.

Safe operating techniques, an explanation of the product's features and controls, and maintenance information is included to help you get the most out of your equipment investment.

Be sure to completely read the Safety Rules and Information found on the following pages. Also completely read the Operation section.





Children

Tragic accidents can occur with children. Do not allow them anywhere near the area of operation. Children are often attracted to the unit and mowing activity. Never assume that children will remain where you last saw them. If there is a risk that children may enter the area where you are mowing, have another responsible adult watch them.

Slope Operation

You could be seriously injured if you use this unit on too steep of a slope. Using the unit on a slope that is too steep where you do not have adequate footing and unit traction (and control) can cause you to lose control and possibly slip and fall or roll the unit over.

Always mow across slopes, not up and down (you could slip and fall.)

You should not operate on a slope greater than a 3.5 foot rise over a 20 foot length (10 degrees).

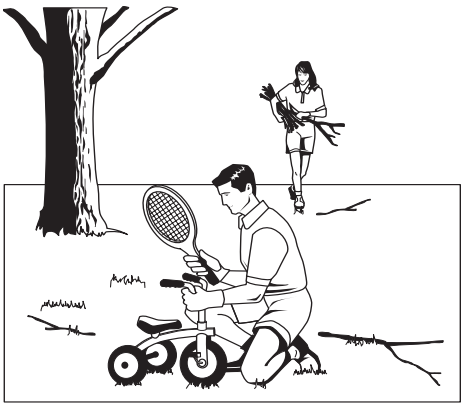
Also, note that the surface you are on can greatly impact your ability to safely operate this machine. Wet grass or soft soil can seriously affect your footing and traction of the unit. Do not operate on slopes that are slippery, wet, or have soft soil.

Thrown Objects

This unit has spinning mower blades. These blades can pick up and throw debris that could seriously injure a bystander. Be sure to clean up the area to be mowed and remove objects that could be thrown by the blade BEFORE you start mowing.

Do not operate this unit without the entire grass catcher or discharge guard (deflector) in place.

Also, do not allow anyone in the area while the unit is running! If someone does enter the area, shut the unit off immediately until they leave.

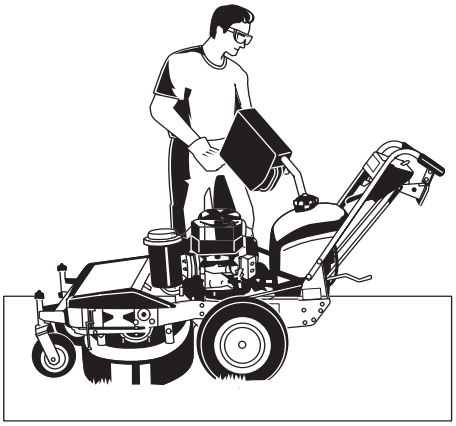


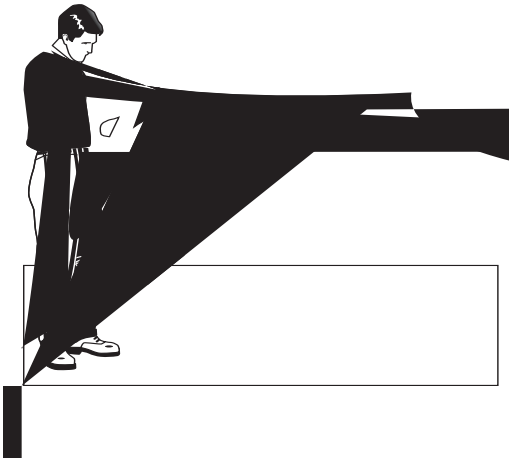
Moving Parts

This equipment has many moving parts that can injure you or someone else. However, if you stay in the operator zone (area behind the handles and controls), and follow the safety rules in this operator's manual, the unit is safe to operate.

The mower deck has spinning mower blades that can amputate hands and feet. Do not allow anyone near the unit while it is running! Keep safety devices (guards, shields, and switches) in place and working.

To help you, the operator, use this equipment safely, it is equipped with an operator-present safety system. Do NOT attempt to alter or bypass the system. See your dealer immediately if the system does not pass all the safety interlock system tests found in this manual.





Fuel and Maintenance

Always disengage all drives, shutoff the engine and remove the key before doing any cleaning, refueling or servicing.

Gasoline and its vapors are extremely flammable. Do not smoke while operating or refueling. Do not add fuel while engine is hot or running. Allow engine to cool for at least 3 minutes prior to adding fuel.

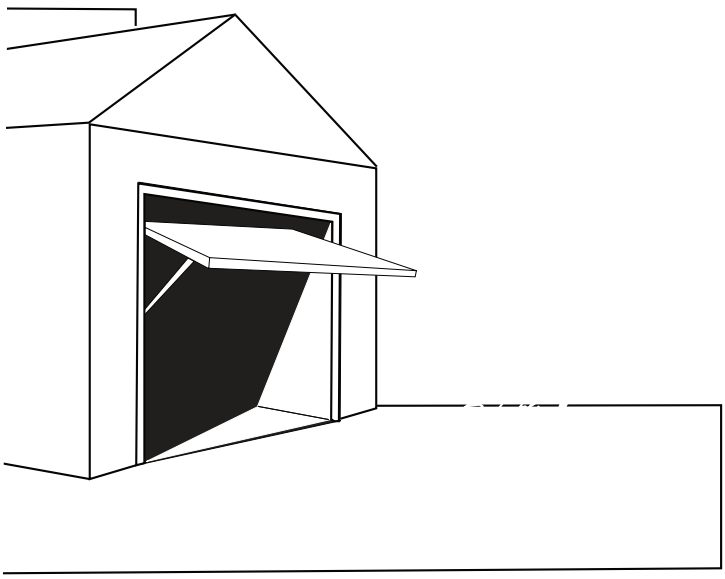
Do not add fuel indoors, in an enclosed trailer, garage or other enclosed area that is not well ventilated. Gasoline spills should be cleaned up promptly and before operation begins.

Gasoline should be stored only in sealed containers approved for fuel.

Proper maintenance is critical to the safety and performance of your unit. Keep the unit free of grass, leaves and excess oil. Be sure to perform the maintenance procedures listed in this manual, especially periodically testing the safety system.

Enclosed Areas

Only operate this unit outdoors and away from unventilated areas such as inside garages or enclosed trailers. The engine emits poisonous carbon monoxide gas and prolonged exposure in an enclosed area can result in serious injury or death.



Read these safety rules and follow them closely. Failure to obey these rules could result in loss of control of unit, severe personal injury or death to you, or bystanders, or damage to property or equipment. **This mowing deck is capable of amputating hands and feet and throwing objects.** The triangle ⚠ in text signifies important cautions or warnings which must be followed.

TRAINING

1. Read, understand, and follow all instructions in the manual and on the unit before starting. If the operator(s) or mechanic(s) can not read English it is the owner's responsibility to explain this material to them.
2. Become familiar with the safe operation of the equipment, operator controls, and safety signs.
3. All operators and mechanics should be trained. The owner is responsible for training the users.
4. Only allow responsible adults, who are familiar with the instructions, to operate the unit.
5. Never let children or untrained people operate or service the equipment. Local regulations may restrict the age of the operator.
6. The owner/user can prevent and is responsible for accidents or injuries occurring to themselves, other people or property.
7. Data indicates that operators, age 60 years and above, are involved in a large percentage of riding mower-related injuries. These operators should evaluate their ability to operate the riding mower safely enough to protect themselves and others from serious injury.

PREPARATION

1. Evaluate the terrain to determine what accessories and attachments are needed to properly and safely perform the job. Use only accessories and attachments approved by the manufacturer.
2. Wear appropriate clothing including safety shoes, safety glasses and ear protection. Long hair, loose clothing or jewelry may get tangled in moving parts.
3. Inspect the area where the equipment is to be used and remove all objects such as rocks, toys and wire, which can be thrown by the machine.
4. Use extra care when handling gasoline and other fuels. They are flammable and vapors are explosive.
   a) Use only an approved container.
   b) Never remove fuel cap or add fuel with the engine running. Allow engine to cool before refueling. Do not smoke.
   c) Never refuel or drain the machine indoors.
5. Check that operator's presence controls, safety switches and shields are attached and functioning properly. Do not operate unless they are functioning properly.

OPERATION

1. Never run an engine in an enclosed area.
2. Mow only in the daylight or with good artificial light, keeping away from holes and hidden hazards.
3. Be sure all drives are in neutral and parking brake is engaged before starting engine. Only start engine from the operator's position. Use seat belts if provided.
4. Be sure of your footing while using pedestrian controlled equipment, especially when backing up. Walk, don't run. Reduced footing could cause slipping.
5. Slow down and use extra care on hillsides. Be sure to travel in the recommended direction on hillsides. Turf conditions can affect the machines stability. Use caution when operating near drop-offs.
6. Do not mow in reverse unless absolutely necessary. Always look down and behind before and while traveling in reverse.
7. Be aware of the mower discharge direction and do not point it at anyone. Do not operate the mower without either the entire grass catcher or the deflector in place.
8. Slow down and use caution when making turns and when changing directions on slopes.
9. Never raise deck with the blades running.
10. Never leave a running unit unattended. Always disengage the PTO, set parking brake, stop engine, and remove keys before dismounting. Keep hands and feet away from the cutting units.
11. Turn off the PTO switch to disengage the blades when not mowing.
12. Never operate with guards not securely in place. Be sure all interlocks are attached, adjusted properly and functioning properly.
13. Never operate with the discharge deflector raised, removed or altered, unless using a grass catcher.
14. Do not change the engine governor setting or overspeed the engine.
15. Stop on level ground, lower implements, disengage drives, engage parking brake, shut off engine before leaving the operator's position for any reason including emptying the grass catchers or unclogging the chute.
16. Stop equipment and inspect blades after striking objects or abnormal vibration occurs. Make necessary repairs before resuming operations.
17. Keep hands and feet away from the cutting units.
18. Look behind and down before backing up to be sure of a clear path.
19. Never carry passengers and keep pets and bystanders away.
20. Do not operate the unit while under the influence of alcohol or drugs.
21. Slow down and use caution when making turns and crossing roads and sidewalks. Stop blades if not mowing.
22. Use care when loading or unloading the machine into a trailer or truck.

23. Use care when approaching blind corners, shrubs, trees or other objects that may obscure vision.
24. To reduce fire hazard, keep unit free of grass, leaves & excess oil. Do not stop or park over dry leaves, grass or combustible materials.
25. The engine in this unit is not factory equipped with a spark arrester. It is a violation of California Public Resource Code Section 4442 to use or operate the engine on or near any forest-covered, brush-covered, or grass-covered land unless the exhaust system is equipped with a spark arrester meeting any applicable local or state laws. Other states or federal area may have similar laws.
26. OSHA regulations may require the use of hearing protection when exposed to sound levels greater than 85 dBA for an 8 hour time period.

⚠CAUTION

This machine produces sound levels in excess of 85 dBA at the operator's ear and can cause hearing loss though extended periods of exposure.

Wear hearing protection when operating this machine.

SLOPE OPERATION

Slopes are a major factor related to loss-of-control and tip-over accidents, which can result in severe injury or death. All slopes require extra caution. If you cannot back up the slope or if you feel uneasy on it, do not drive on it.

⚠WARNING

Never operate on slopes greater than 17.6 percent (10°) which is a rise of 3-1/2 feet (106 cm) vertically in 20 feet (607 cm) horizontally.

Select slow ground speed before driving onto slope. Use extra caution when operating on slopes with rear-mounted grass catchers.

Mow across the face of slopes, not up and down, use caution when changing directions and DO NOT START OR STOP ON SLOPE.

Do

1. Mow across slopes, not up and down.
2. Remove obstacles such as rocks, tree limbs, etc.
3. Watch for holes, ruts, or bumps. Uneven terrain could overturn the unit. Tall grass can hide obstacles.
4. Use slow speed. Choose a slow speed so that you will not have to stop or change speed while on the slope.
5. Use extra care with grass catchers or other attachments. These can change the stability of the unit.
6. Keep all movement on the slopes slow and gradual. Do not make sudden changes in speed or direction.
7. See your authorized dealer for recommendations of available weights to improve stability.

Do Not

1. Avoid starting, stopping, or turning on a slope. If tires lose traction (i.e. machine stops forward motion on a slope), disengage the blade(s) (PTO) and drive slow off the slope.
2. Do not turn on slopes unless necessary, and then, turn slowly and gradually uphill, if possible. Never mow down slopes.
3. Do not mow near drop-offs, ditches, or embankments. The operator could lose footing or balance or mower could suddenly turn over if a wheel is over the edge of a cliff or ditch, or if an edge caves in.
4. Do not mow on wet grass. Reduced footing or traction could cause sliding.
5. Do not try to stabilize the unit by putting your foot on the ground. (ride-on units)
6. Do not mow excessively steep slopes.
7. Do not use grass catcher on steep slopes.
8. Do not mow slopes if you cannot back up them.

TOWED EQUIPMENT (RIDE-ON UNITS)

1. Tow only with a machine that has a hitch designed for towing. Do not attach towed equipment except at the hitch point.
2. Follow the manufacturer's recommendations for weight limit for towed equipment and towing on slopes. See attaching a trailer under OPERATION.
3. Never allow children or others in or on towed equipment.
4. On slopes, the weight of the towed equipment may cause loss of traction and loss of control.
5. Travel slowly and allow extra distance to stop.
6. Do not shift to neutral and coast down hill.

CHILDREN

Tragic accidents can occur if the operator is not alert to the presence of children. Children are often attracted to the unit and the mowing activity. Never assume that children will remain where you last saw them.

1. Keep children out of the mowing area and under the watchful care of another responsible adult.
2. Be alert and turn unit off if children enter the area.
3. Before and during reverse operation, look behind and down for small children.
4. Never carry children, even with the blade(s) off. They may fall off and be seriously injured or interfere with safe unit operation. Children who have been given rides in the past may suddenly appear in the mowing area for another ride and be run over or backed over by the machine.
5. Never allow children to operate the unit.
6. Use extra care when approaching blind corners, shrubs, trees, or other objects that may obscure vision.

EMISSIONS

1. Engine exhaust from this product contains chemicals known, in certain quantities, to cause cancer, birth defects, or other reproductive harm.
2. Look for the relevant Emissions Durability Period and Air Index information on the engine emissions label.

SERVICE AND MAINTENANCE

To avoid personal injury or property damage, use extreme care in handling gasoline. Gasoline is extremely flammable and the vapors are explosive.

Safe Handling of Gasoline

1. Extinguish all cigarettes, cigars, pipes, and other sources of ignition.
2. Use only approved gasoline containers.
3. Never remove the gas cap or add fuel with the engine running. Allow the engine to cool before refueling.
4. Never fuel the machine indoors.
5. Never store the machine or fuel container where there is an open flame, spark, or pilot light such as near a water heater or other appliance.
6. Never fill containers inside a vehicle or on a truck bed with a plastic bed liner. Always place containers on the ground away from your vehicle before filling.
7. Remove gas-powered equipment from the truck or trailer and refuel it on the ground. If this is not possible, then refuel such equipment on a trailer with a portable container, rather than from a gasoline dispenser nozzle.
8. Keep nozzle in contact with the rim of the fuel tank or container opening at all times until fueling is complete. Do not use a nozzle lock-open device.
9. If fuel is spilled on clothing, change clothing immediately.
10. Never over-fill the fuel tank. Replace gas cap and tighten securely.
11. Use extra care in handling gasoline and other fuels. They are flammable and vapors are explosive.
12. If fuel is spilled, do not attempt to start the engine but move the machine away from the area of spillage and avoid creating any source of ignition until fuel vapors have dissipated.
13. Replace all fuel tank caps and fuel container caps securely.

Maintenance and Storage

1. Always observe safe refueling and fuel handling practices when refueling the unit after transportation or storage.
2. Always follow the engine manual instructions for storage preparations before storing the unit for both short and long term periods.
3. Always follow the engine manual instructions for proper start-up procedures when returning the unit to service.
4. Never store the machine or fuel container inside where there is an open flame, such as in a water heater. Allow unit to cool before storing.
5. Shut off fuel while storing or transporting. Do not store fuel near flames or drain indoors.
6. Keep all hardware, especially blade attachment bolts, tight and keep all parts in good working condition. Replace all worn or damaged decals.
7. Never tamper with safety devices. Check their proper operation regularly.
8. Disengage drives, lower implement, set parking brake, stop engine and remove key or disconnect spark plug wire. Wait for all movement to stop before adjusting, cleaning or repairing.
9. Clean grass and debris from cutting units, drives, mufflers, and engine to prevent fires. Clean up oil or fuel spillage.
10. Let engine cool before storing and do not store near flame.
11. Stop and inspect the equipment if you strike an object. Repair, if necessary, before restarting.
12. Park machine on level ground. Never allow untrained personnel to service machine.
13. Use jack stands to support components when required.
14. Carefully release pressure from components with stored energy.
15. Disconnect battery or remove spark plug wire before making any repairs. Disconnect the negative terminal first and the positive last. Reconnect positive first and negative last.
16. Use care when checking blades. Wrap the blade(s) or wear gloves, and use caution when servicing them. Only replace blades. Never straighten or weld them.
17. Keep hands and feet away from moving parts. If possible, do not make adjustments with the engine running.
18. Charge batteries in an open well ventilated area, away from spark and flames. Unplug charger before connecting or disconnecting from battery. Wear protective clothes and use insulated tools.
19. Grass catcher components are subject to wear, damage, and deterioration, which could expose moving parts or allow objects to be thrown. Frequently check components and replace with manufacturer's recommended parts, when necessary.
20. Check brake operation frequently. Adjust and service as required.
21. Use only factory authorized replacement parts when making repairs.
22. Always comply with factory specifications on all settings and adjustments.
23. Only authorized service locations should be utilized for major service and repair requirements.
24. Never attempt to make major repairs on this unit unless you have been properly trained. Improper service procedures can result in hazardous operation, equipment damage and voiding of manufacturer's warranty.
25. Units with hydraulic pumps, hoses, or motors: WARNING: Hydraulic fluid escaping under pressure may have sufficient force to penetrate skin and cause serious injury. If foreign fluid is injected into the skin it must be surgically removed within a few hours by a doctor familiar with this form of injury or gangrene may result. Keep body and hands away from pin holes or nozzles that eject hydraulic fluid under high pressure. Use paper or cardboard, and not hands, to search for leaks. Make sure all hydraulic fluid connections are tight and all hydraulic hoses and lines are in good condition before applying pressure to the system. If leaks occur, have the unit serviced immediately by your authorized dealer.
26. WARNING: Stored energy device. Improper release of springs can result in serious personal injury. Springs should be removed by an authorized technician.

27. Models equipped with an engine radiator: WARNING: Stored energy device. To prevent serious bodily injury from hot coolant or steam blow-out, never attempt to remove the radiator cap while the engine is running. Stop the engine and wait until it is cool. Even then, use extreme care when removing the cap.

ROLL BAR INSTRUCTIONS

For models equipped with factory-installed Roll Over Protection System (ROPS).

⚠ WARNING

In order to avoid serious injury or death from roll over, it is important to follow the warnings listed below.

OPERATIONAL WARNINGS

- Always use the seat belt when the roll bar is in the raised position.
- Never use the seat belt when the roll bar is in the down position.
- Remember there is no roll over protection when the roll bar is in the down position so it is very important to always keep the roll bar in the raised position whenever possible.
- Lower the roll bar to the down position only when it is absolutely necessary.
- Check for overhead clearances before driving under any objects. Do not allow roll bar to contact low overhanging obstacles such as tree branches and guide wires.
- Never remove the roll bar from the vehicle.
- Do not exceed the machine weight rating of the roll bar.
- Read and follow all of the instructions shown below regarding the inspection and maintenance of the roll bar structure and the seat belt.

⚠ WARNING

Failure to properly inspect and maintain the ROLL BAR protective structure can cause serious injury or death.

INSPECTION OF THE ROLL BAR PROTECTIVE STRUCTURE

A ROLL BAR, like any other safety device, needs to be periodically inspected to verify that the integrity of the device has not been compromised through normal machine use, misuse, age degradation, modifications, or a roll over.

To maintain operator roll over protection and roll bar effectiveness:

- If a ROLL BAR becomes damaged for any reason, such as a collision, roll over or impact, the ROLL BAR must be replaced. Small undetectable cracks can reduce the effectiveness of the ROLL BAR. Never weld, straighten, or repair the ROLL BAR.
- Never alter the ROLL BAR by welding anything to it or by drilling additional holes.
- **BEFORE FIRST TIME USE** - Inspect the ROLL BAR structure and mounting hardware for:
  1) Check to make sure the machine GVW (Gross Vehicle Weight), including attachments, restrained payload, fuel and operator, is not in excess of the maximum weight specified on the ROLL BAR label.
  2) Make sure there isn't any missing, damaged, or loose mounting hardware.
  3) Make sure the ROLL BAR has been correctly and completely installed.
- **EVERY 100 HOURS** - Inspect the ROLL BAR structure and mounting hardware for:
  1) Any cracks in the structure (structural members and/or welds).
  2) Significant corrosion on any part of the ROLL BAR structure or hardware.
  3) Missing, damaged, or loose mounting hardware
  4) Mounting hardware that is of a grade lesser than specified.
  5) Machine GVW (Gross Vehicle Weight), including attachments, restrained payload, fuel and operator, in excess of the maximum weight specified on the ROLL BAR label.
  6) Any modifications that have been made, such as unauthorized welds and holes.
  7) Any permanent deformation or twisting of the ROLL BAR structure.
  8) That the ROLL BAR label is still in place and is readable.
  9) That the ROLL BAR on-product warning labels are still on the ROLL BAR and are readable.
- If there is any doubt as to the condition of the ROLL BAR, remove the machine from service and contact your dealer for assistance.

⚠ WARNING

Failure to properly inspect and maintain the seat belt can cause serious injury or death.

INSPECTION AND MAINTENANCE OF THE ROLL BAR SEAT BELT

- The seat belt like the ROLL BAR, needs to be periodically inspected to verify that the integrity has not been compromised through normal machine use, misuse, age degradation, modifications, or a roll over. If the seat belt does not pass all of the following tests, it should be replaced.

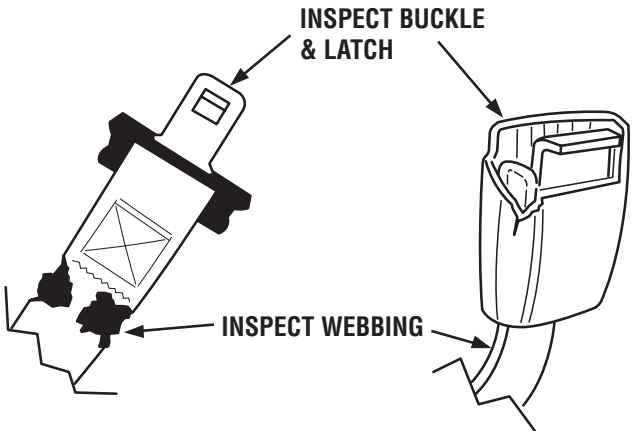
- **BEFORE EACH USE** – Conduct the following inspections/maintenance of the seat belt and retraction mechanism:

  1) Check for dirt or debris in the retraction mechanism. If dirt or debris is found, it should be removed.

  2) Check to make sure the retraction mechanism retracts easily and completely.

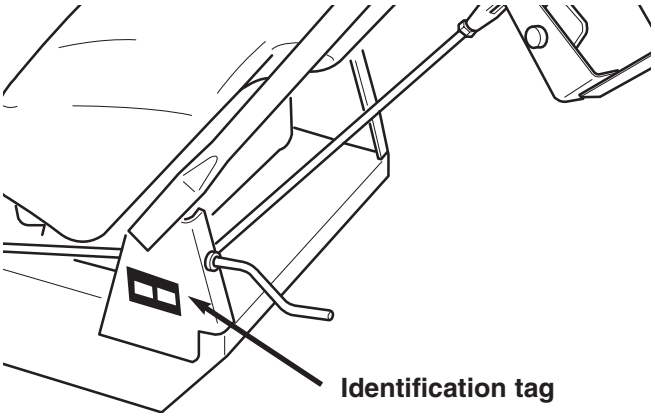
  3) Check for damage to any part of the seat belt such as nicks, cuts, loose stitching, or fraying.

  4) Check that the buckle and latch operate properly and that the latch plate is not excessively worn, deformed, or the buckle is damaged or cracked. The seat belt should latch and release easily.



Identification Numbers

SAMPLE



When contacting your authorized dealer for replacement parts, service, or information you MUST have these numbers.

Record your model/serial number and engine serial numbers on the space provided for easy access. These numbers can be found in the locations shown.

NOTE: For location of engine identification numbers, refer to the engine owner's manual.

SAFETY DECALS

This unit has been designed and manufactured to provide you with the safety and reliability you would expect from an industry leader in outdoor power equipment manufacturing.

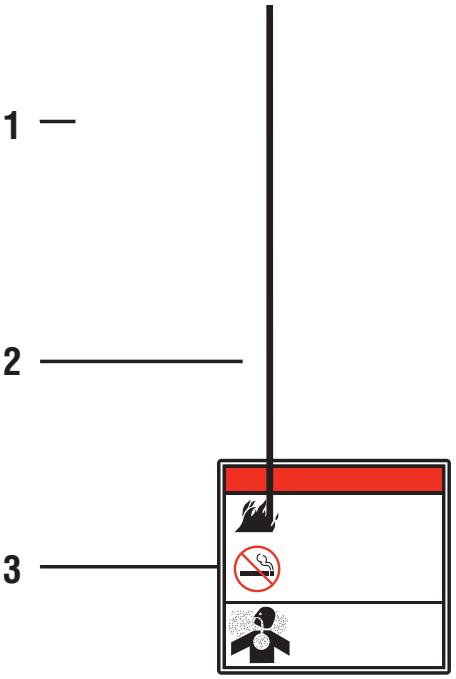
Although reading this manual and the safety instructions it contains will provide you with the necessary basic knowledge to operate this equipment safely and effectively, we have placed several safety labels on the unit to remind you of this important information while you are operating your unit.

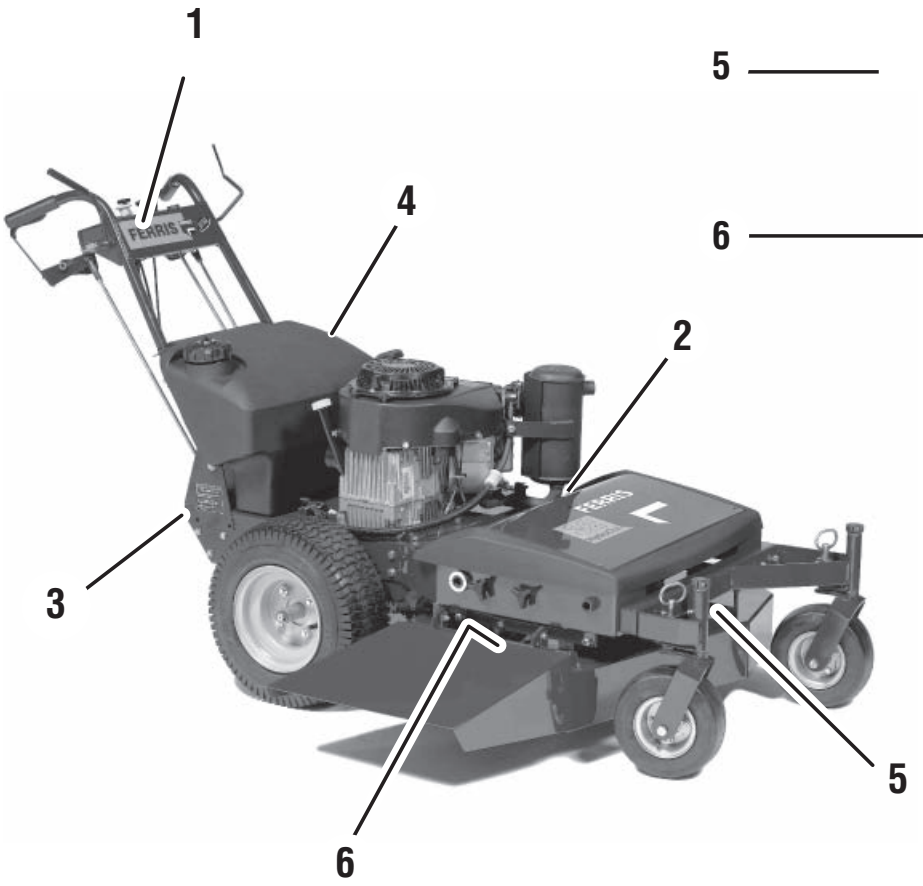
All DANGER, WARNING, CAUTION and instructional messages on your mower should be carefully read and obeyed. Personal bodily injury can result when these instructions are not followed. The information is for your safety and it is important!

The safety decals below are on your mower.

If any of these decals are lost or damaged, replace them at once. See your local dealer for replacements.

These labels are easily applied and will act as a constant visual reminder to you, and others who may use the equipment, to follow the safety instructions necessary for safe, effective operation.





SAFETY INTERLOCK SYSTEM

This unit is equipped with safety interlock switches and other safety devices. These safety systems are present for your safety, do not attempt to bypass safety switches, and never tamper with safety devices. Check their operation regularly.

Operational SAFETY Checks

Your unit is equipped with an operator presence switch safety system. Check the operator presence switch operation every fall and spring with the following tests.

Test 1 — Engine WILL NOT start if:

- PTO switch is engaged.
- Parking brake is disengaged. (36” model only)

Test 2 — Engine WILL start if:

- PTO switch is NOT engaged.
- Parking brake is engaged. (36” model only)

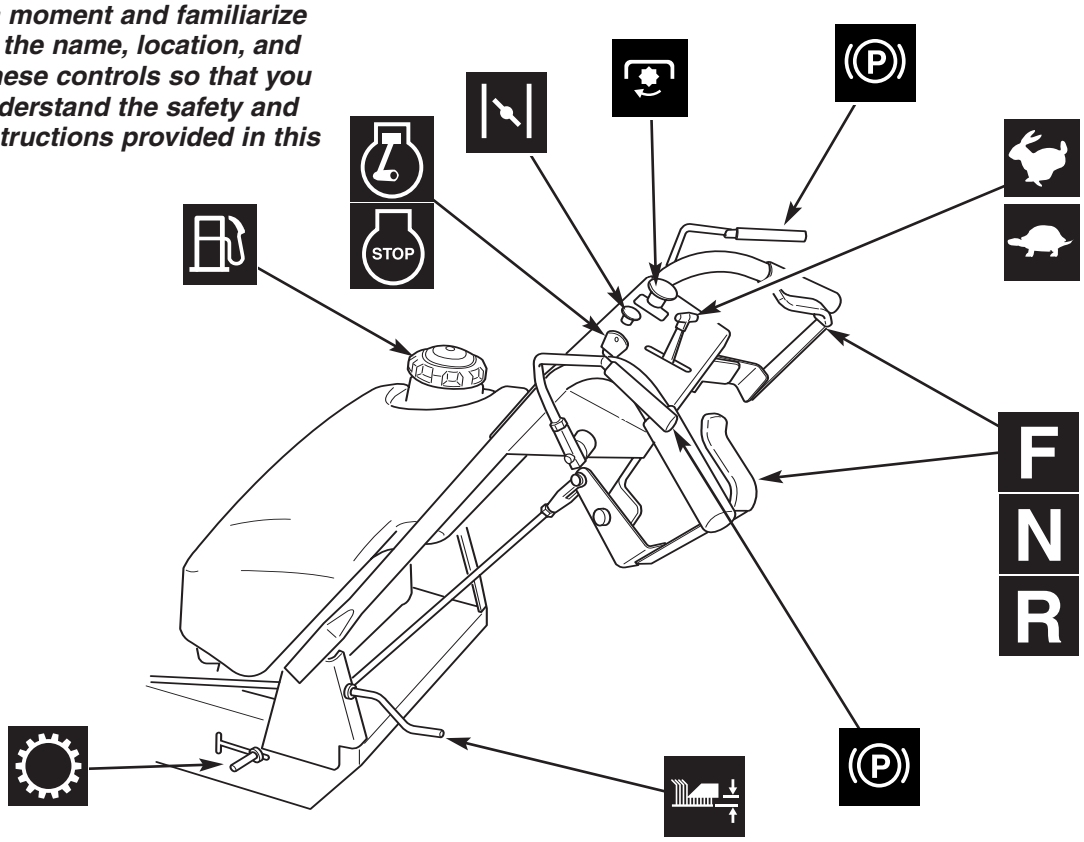
Test 3 — Engine should SHUT OFF if:

- Operator releases the operator presence / parking brake handles with PTO engaged. (manual start)
- Operator releases the ground speed control handles / operator presence with the PTO engaged. (electric start)
- Operator releases the ground speed control handles / operator presence with the parking brake disengaged. (36” model)

Test 4 — Blade Brake Check

Mower blades and mower drive belt should come to a complete stop within seven (7) seconds after electric PTO switch is turned off (or operator releases

Please take a moment and familiarize yourself with the name, location, and function of these controls so that you will better understand the safety and operating instructions provided in this manual.



CONTROL FUNCTIONS

The information below briefly describes the function of individual controls. Starting, stopping, driving, and mowing require the combined use of several controls applied in specific sequences. To learn what combination and sequence of controls to use for various tasks see the OPERATION section.

F N R Ground Speed Control Levers

These levers control the ground speed of the mower. The left and right levers are tied together so you can operate either lever to control the mower's ground speed.

Moving a lever forward to "F" increases the FORWARD speed of the mower. Moving a lever back to "R" increases the REVERSE speed. Moving the levers to to "N" neutral position stops mower travel.

Note: The further a lever is moved away from the neutral position the faster the mower will travel.

Ignition Switch

Rotate the key switch to the ON position before pulling on the starter rope. Turn the key to STOP to stop the engine.

Throttle Control

Pulling the round choke control knob (D) out fully chokes the engine for cold starts. (A warm engine may not require choking.) Moving the throttle control (C) fully forward is FULL throttle position. Always operate the unit at FULL throttle when mowing.

Choke

Close the choke for cold starting. Open the choke once the engine starts. A warm engine may not require choking. Pull the knob UP to close the choke. Push to knob DOWN to open the choke.

PTO (Power Take Off) Switch

The PTO Switch engages and disengages the mower blades.

To engage the mower blades, pull up on the switch. To disengage the mower blades, push down on the switch.

When the PTO engagement lever or switch is in the Engaged position, the Engine Kill system is activated.

Operator Presence / Parking Brake Handles

This control deactivates the engine kill system and disengages the parking brake when depressed. Release the handles to activate the engine kill system and engage the parking brake. The engine will shut off if the operator releases the handles with the PTO engaged.

Cutting Height Adjust Handle

The cutting height adjust handle controls the mower cutting height. To adjust the mower cutting height, turn the crank handle clockwise to raise the cutting height. Turn the crank handle counterclockwise to lower the cutting height. Observe the cutting height indicator on the left side of the mower deck.

Fuel Tank Cap

To remove cap, turn counterclockwise.

Transmission Release Valve

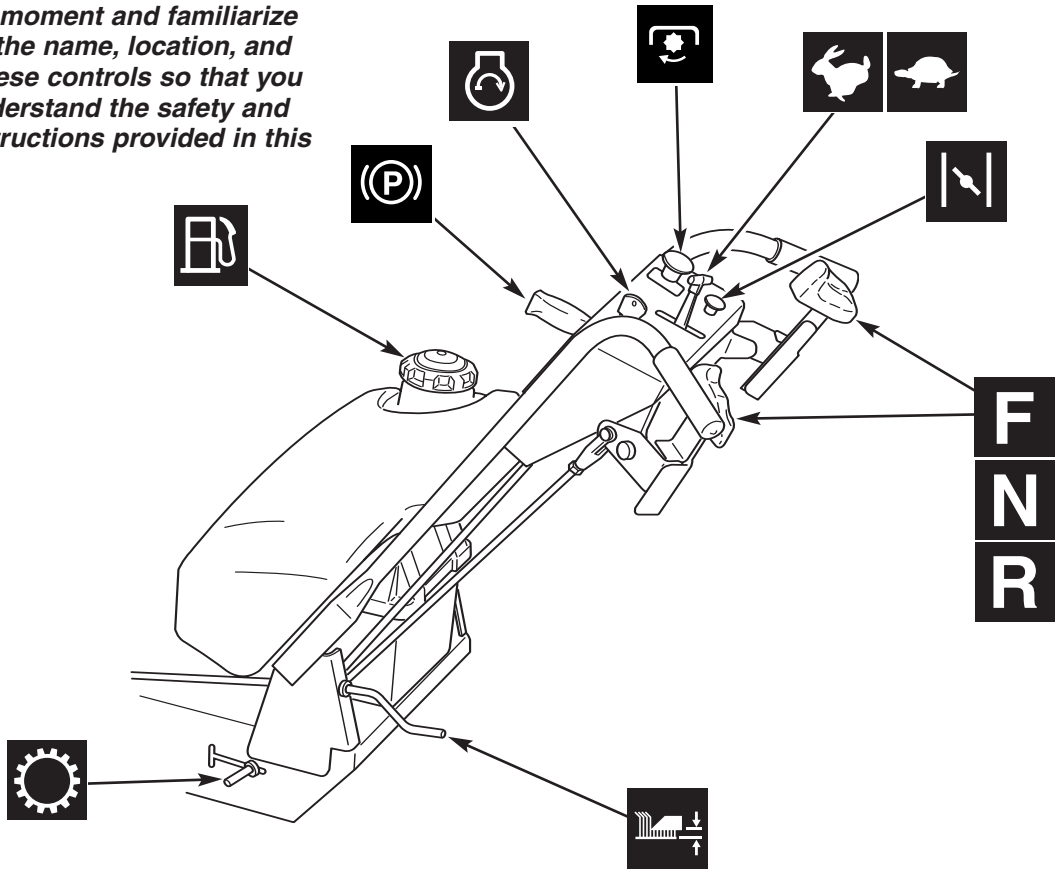
The transmission release valve deactivates the transmissions so that the unit can be pushed by hand.

Engages the transmission; the mower will move under its own power.

Disengages the transmission; the mower can now be pushed by hand.

See PUSHING THE MOWER BY HAND for operational information.

Please take a moment and familiarize yourself with the name, location, and function of these controls so that you will better understand the safety and operating instructions provided in this manual.



CONTROL FUNCTIONS

The information below briefly describes the function of individual controls. Starting, stopping, driving, and mowing require the combined use of several controls applied in specific sequences. To learn what combination and sequence of controls to use for various tasks see the OPERATION section.

F N R Ground Speed Control Handles / Operator Presence

These handles control the ground speed of the mower. The left and right handles are tied together so you can operate either lever to control the mower's ground speed.

Moving a handle forward to "F" increases the FORWARD speed of the mower. Moving a handle back to "R" increases the REVERSE speed. Moving the handles to to "N" neutral position stops mower travel.

Note: The further a handle is moved away from the neutral position the faster the mower will travel.

These handles also deactivate the engine kill system when depressed. Release the handles to activate the engine kill system. The engine will shut off if the operator releases the handles with the PTO engaged or parking brake disengaged.

Ignition Switch

The ignition switch starts and stops the engine, it has three positions:

	OFF	Stops the engine and shuts off the electrical system.
	RUN	Allows the engine to run and powers t the electrical system.
	START	Cranks the engine for starting.

NOTE: Never leave the ignition switch in the RUN position with the engine stopped–this drains the battery.

Throttle Control

Pulling the round choke control knob (D) out fully chokes the engine for cold starts. (A warm engine may not require choking.) Moving the throttle control (C) fully forward is FULL throttle position. Always operate the unit at FULL throttle when mowing.

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Close the choke for cold starting. Open the choke once the engine starts. A warm engine may not require choking. Pull the knob UP to close the choke. Push to knob DOWN to open the choke.

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To engage the mower blades, pull up on the switch. To disengage the mower blades, push down on the switch.

When the PTO engagement lever or switch is in the Engaged position, the Engine Kill system is activated.

Parking Brake

DISENGAGE Releases the parking brake.

ENGAGE Locks the parking brake.

Pull the parking brake lever back to engage the parking brake. Move the lever fully forward to disengage the parking brake. *NOTE: To start the unit the parking brake must be engaged.*

Cutting Height Adjust Handle

The cutting height adjust handle controls the mower cutting height. To adjust the mower cutting height, turn the crank handle clockwise to raise the cutting height. Turn the crank handle counterclockwise to lower the cutting height. Observe the cutting height indicator on the left side of the mower deck.

Fuel Tank Cap

To remove cap, turn counterclockwise.

Transmission Release Valve

The transmission release valve deactivates the transmissions so that the unit can be pushed by hand.

Engages the transmission; the mower will move under its own power.

Disengages the transmission; the mower can now be pushed by hand.

See PUSHING THE MOWER BY HAND for operational information.

GENERAL OPERATING SAFETY

Before first time operation:

- Be sure to read all information in the Safety and Operation sections before attempting to operate this tractor and mower.
- Become familiar with all of the controls and how to stop the unit.
- Drive in an open area without mowing to become accustomed to the unit.

CHECKS BEFORE STARTING

- Check that crankcase is filled to full mark on dipstick. See the engine Operator's Manual for instructions and oil recommendations.
- Make sure all nuts, bolts, screws and pins are in place and tight.
- Fill the fuel tank with fresh fuel. Refer to engine manual for fuel recommendations.
- Make sure fuel shut off valve is in the ON position.

⚠ WARNING

Before leaving the operator's position for any reason, disengage the PTO, stop the engine and remove the key.

To reduce fire hazard, keep the engine, tractor and mower free of grass, leaves and excess grease. Do not stop or park tractor over dry leaves, grass or combustible materials.

Gasoline is highly flammable and must be handled with care. Never fill the tank when the engine is still hot from recent operation. Do not allow open flame, smoking or matches in the area. Avoid over-filling and wipe up any spills.

⚠ WARNING

Never operate on slopes greater than 17.6 percent (10°) which is a rise of 3-1/2 feet (106 cm) vertically in 20 feet (607 cm) horizontally.

Select slow ground speed before driving onto a slope. Use extra caution when operating on slopes.

Mow up and down the face of slopes, not across, use caution when changing directions and DO NOT START OR STOP ON SLOPE.

⚠ WARNING

If you do not understand how a specific control functions, or have not yet thoroughly read the FEATURES & CONTROLS section, do so now.

Do NOT attempt to operate the tractor without first becoming familiar with the location and function of ALL controls.

STARTING THE ENGINE

- Make sure the PTO switch is disengaged and the parking brake is engaged (36" model only).
- Set the engine throttle control to FAST throttle position. Then fully close the choke by pulling the knob OUT fully.

NOTE: A warm engine may not require choking.

Manual Start:

- Insert the key into the ignition switch and turn it to RUN.
- Grasp recoil handle and pull cord briskly. (You may have to pull several times before engine starts. If engine fails to start within a reasonable number of attempts, discontinue and check engine manual for further instructions.)

NOTE: Be sure recoil cord retracts fully into recoil unit. A slack recoil cord can cause serious personal injury and/or damage to unit.

- After the engine starts, gradually open the choke (push knob down fully).

Electric Start:

- Insert the key into the ignition switch and turn it to START.
- After the engine starts, gradually open the choke (push knob down fully).

Warm up the engine by running it for at least a minute before engaging the PTO lever/switch or driving the mower.

After warming the engine, ALWAYS operate the unit at FULL THROTTLE when mowing.

In the event of an emergency the engine can be stopped by simply turning the ignition switch to STOP. *Use this method only in emergency situations. For normal engine shut down follow the procedure given in STOPPING THE MOWER.*

DRIVING THE MOWER

- Make sure the PTO switch is disengaged.
- Start the engine (see STARTING THE ENGINE).
- Set the throttle control to FULL.
- ***Manual Start:*** Grasp the operator presence / parking brake handles and the handle bar grips at the same time to deactivate engine kill system and disengage the parking brake.
- ***Electric Start:*** Push down on either one of the speed control handles to deactivate engine kill system. Push the brake lever forward to disengage the parking brake.
- With your thumbs, pressing the ground speed control levers forward will move the mower forward. Pulling them back will move the mower backwards. The farther the levers are pushed or pulled will result in a faster ground speed.
- To slow the mower, gently release your thumb pressure on the ground speed control levers to return them to the neutral position.

OPERATING ON A SLOPE

While it is not recommended, traveling up and down slopes may be required from time to time. These guide lines are listed for your safety.

Traveling Up a Slope

Since the hill climbing ability of the machine will probably far exceed any other machine you may have operated, caution should be observed.

- Never make abrupt speed or direction changes on a slope.
- Never push down on the handle bars while going up a grade. A slight lifting pressure is recommended to keep the front wheels on the ground.

Traveling Down a Slope

A very slow ground speed should always be used when traveling down a slope. This can be accomplished by GENTLY moving the ground speed control levers towards the reverse direction.

STOPPING THE MOWER

- Returning the ground speed control levers to the neutral position will stop movement.
- Disengage the PTO.
- ***Manual Start*** Release the operator presence / parking brake handles to engage the parking brake.
- ***Electric Start:*** Engage the parking brake.
- Move the throttle control to mid-throttle position and turn the ignition key to OFF. Remove the key.

PUSHING THE MOWER BY HAND

DO NOT TOW MOWER
Towing the unit will cause hydraulic transmission damage. Do not use another vehicle to push or pull this unit.

- Disengage the PTO, turn the ignition OFF, and remove the key.
- Slide the hydraulic release rod forward and lock into the top of the “T” slot. See Figure 1.
- ***Manual Start:*** Grasp the operator presence / parking brake handles and the handle bar grips at the same time to disengage the parking brake.
- ***Electric Start::*** Disengage the parking brake.

  The mower can now be pushed by hand.
- After moving the mower, re-engage the transmission (DRIVE position) by releasing the rod from the “T” and sliding the release handle towards the rear of the machine.

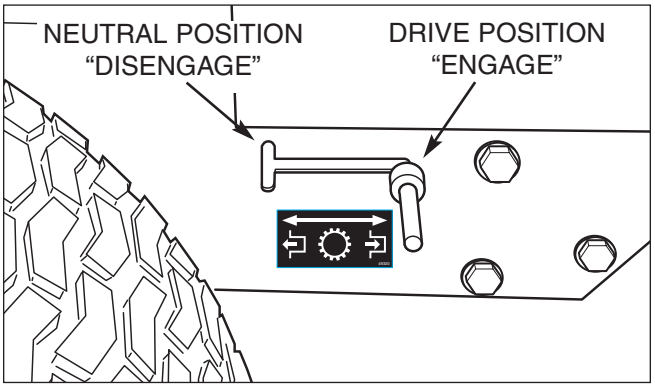


Figure 1. Hydraulic Release Rod

MOWING

- Make sure the PTO switch is disengaged.
- Start the engine (see STARTING THE ENGINE).
- Set the throttle control to FULL.
- ***Manual Start:*** Grasp the operator presence / parking brake handles and the handle bar grips at the same time to deactivate engine kill system and disengage the parking brake.
- ***Electric Start:*** Push down on either one of the speed control handles to deactivate engine kill system. Push the brake lever forward to disengage the parking brake.
- Engage the PTO by pulling up on the PTO switch.
- Begin mowing. See Lawn Care Section in the back of this manual for tips on mowing patterns, lawn care, and trouble shooting information.
- When finished, disengage the PTO.
- Stop the engine (see STOPPING THE MOWER).

MOWING RECOMMENDATIONS

Several factors can affect how well your machine cuts grass, Following proper mowing recommendations can improve the performance and life of your machine.

Height of Grass

Often cutting height is a matter of personal preference. Typically, you should mow the grass when it is is between three and five inches high. The proper cutting height range for a specific lawn will depend upon several factors, including the type of grass, the amount of rainfall, the prevailing temperature, and the lawn's overall condition.

Cutting the grass too short causes weak, thin grass plants, which are easily damaged by dry periods and pests. Cutting too short is often more damaging than allowing the grass to be slightly higher.

Letting grass grow a bit longer—especially when it is hot and dry—reduces heat build-up, preserves needed moisture and protects the grass from heat damage and other problems. However, allowing grass to grow too high can cause thin turf and additional problems.

Cutting off too much at one time shocks the plant's growth system and weakens the grass plants. **A good rule of thumb is the 1/3 rule: to cut no more than one third of the grass height, and never more than 1 inch at a time.**

The amount of grass you are able to cut in one pass is also effected by the type of mowing system you are using (for example, broadcasting with side discharge decks can process a much larger volume of grass than mulching does).

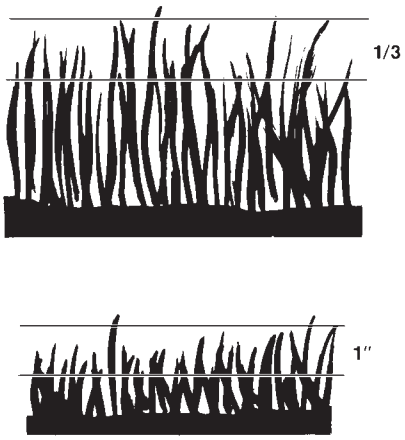


Figure 2. Proper Cutting Height

Tall Grass Requires Incremental Cutting

For extremely tall grass, set the cutting height at maximum for the first pass, and then reset it to the desired height and mow a second or third time.

Don't cover the grass surface with a heavy layer of clippings. Consider using a grass collection system and starting a compost pile.

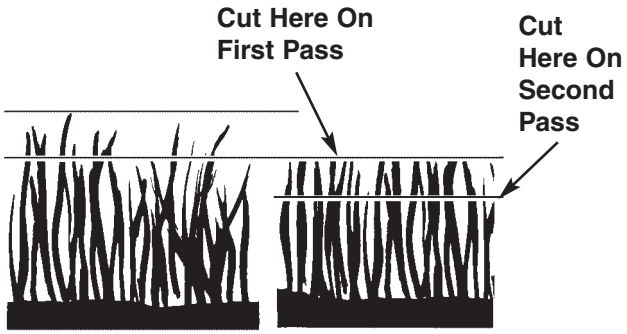


Figure 3. Incremental Cutting

When and How Often to Mow

The time of day and condition of the grass greatly affect the results you'll get when mowing. For the best results, follow these guidelines:

1. Mow when the grass is between three and five inches high.
2. Mow with sharp blades. Short clippings of grass one inch or shorter decompose more quickly than longer blades. Sharp mower blades cut grass cleanly and efficiently, preventing frayed edges which harm the grass.
3. Mow at time of day when the grass is cool and dry. Late afternoon or early evening often provide these ideal mowing conditions.
4. Avoid mowing after rain or even heavy dew, and never mulch when the grass is wet (moist grass does not mulch well, and clumps beneath the mower deck).

Mowing Patterns

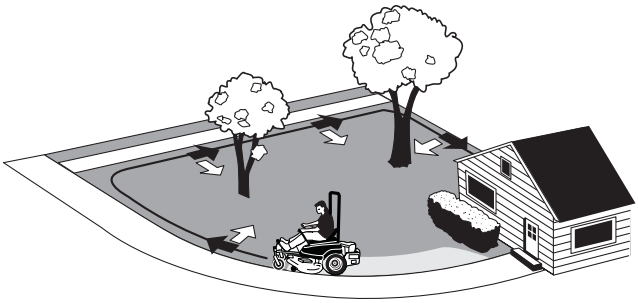
Always start mowing on a smooth, level area.

The size and type of area to be mowed will determine the best mowing pattern to use. Obstructions such as trees, fences and buildings, and conditions such as slopes and grades must also be considered.

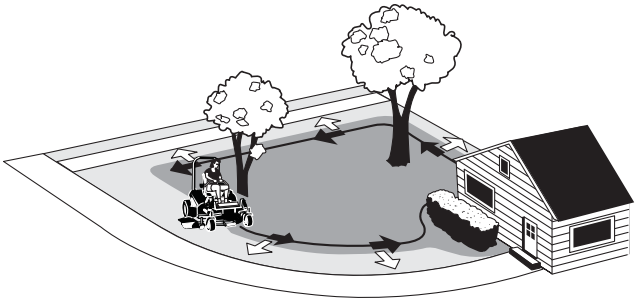
1. Cut long straight strips overlapping slightly.
2. Where possible, change patterns occasionally to eliminate matting, graining or a corrugated appearance.
3. For a truly professional cut, mow across the lawn in one direction, then recut the lawn by mowing perpendicular to the previous cut.

Note: Always operate the engine at full throttle when mowing.

If you hear the engine slowing down, you are mowing too fast—using a slower ground speed will improve the cutting efficiency of the blades and prevents many common cutting problems. Use an appropriate ground speed for the thickness and height of the grass you are cutting (3rd gear or slower for manual gear models). If you hear the engine slowing down you are mowing too fast, use a slower ground speed.



Where possible, make one or two passes around the outside of the area discharging the grass INTO the lawn to keep the cut grass off fences and walks.



The remainder of the mowing should be done in the opposite direction so that the clippings are dispersed OUT onto the area of lawn previously cut.

MOWING METHODS

Proper Broadcast Mowing

Broadcasting, or side-discharging, disperses fine clippings evenly over the entire lawn. Many golf courses use this method. Your mower has a deep dish deck to allow freer circulation of clippings so they are broadcast evenly over the lawn.

ENGINE SPEED & GROUND SPEED FOR BROADCASTING

Always operate the engine at full throttle when mowing. If you hear the engine slowing down, you are mowing too fast—using a slower ground speed will improve the cutting efficiency of the blades and prevents many common cutting problems.

ALWAYS use an appropriate ground speed for the thickness and height of the grass you are cutting (3rd gear or slower for manual gear models). If you hear the engine slowing down you are mowing too fast, use a slower ground speed.

HOW MUCH GRASS TO CUT OFF WHEN BROADCASTING

Mow when the grass is 3-5 inches long. Do not cut the grass shorter than 2 to 2-1/2 inches. Do not cut off more that 1 inch of grass in a single pass

Proper Mulching

Mulching consists of a mower deck which cuts and recuts clippings into tiny particles and which then blows them down INTO the lawn. These tiny particles decompose rapidly into by-products your lawn can use. UNDER PROPER CONDITIONS, your mulching mower will virtually eliminate noticeable clippings on the lawn surface.

NOTE: When mulching under heavy cutting conditions, a rumbling sound may be present and is normal.

MULCHING REQUIRES EXCELLENT MOWING CONDITIONS

Mulching mowers cannot function properly if the grass is wet, or if the grass is simply to high to cut. Even more than normal mowing, mulching requires that the grass be dry and the the appropriate amount is cut.

Do not use the mower as a mulching mower during the first two or three mowings in the spring. The long grass blades, quick growth, and often wetter conditions are more suitable for broadcasting (side-discharging) or grass bagging operation.

ENGINE SPEED & GROUND SPEED FOR BROADCASTING

Use full engine throttle matched with a slow ground speed so that clippings will be finely cut. Ground speed while mulching should be HALF of the speed that would be used when broadcasting (side discharging) under similar conditions. Since mulching requires more horsepower than broadcasting, using a slower ground speed is vitally important for proper mulching operation.

HOW MUCH GRASS TO MULCH

The best mulching action typically results from cutting only the top 1/2 inch to 3/4 inch of grass blade. This provides short clippings which decompose properly (much more quickly than longer clippings). The ideal cutting height will vary with climate, time of year, and quality of your lawn. We recommend that you experiment with both the cutting height and ground speed until you achieve the best cut. Start with a high cutting height and using progressively lower settings until you find a cutting height that is matched to your mowing conditions and preferences.

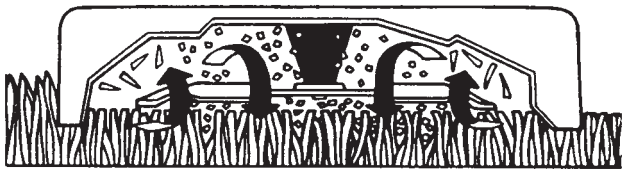


Figure 4. Mulching Action

STORAGE

Temporary Storage (30 Days Or Less)

Remember, the fuel tank will still contain some gasoline, so never store the unit indoors or in any other area where fuel vapor could travel to any ignition source. Fuel vapor is also toxic if inhaled, so never store the unit in any structure used for human or animal habitation.

Here is a checklist of things to do when storing your unit temporarily or in between uses:

- Keep the unit in an area away from where children may come into contact with it. If there's any chance of unauthorized use, remove the spark plug (s) and put in a safe place. Be sure the spark plug opening is protected from foreign objects with a suitable cover.
- If the unit can't be stored on a reasonable level surface, chock the wheels.
- Clean all grass and dirt from the mower.

Long Term Storage (Longer Than 30 Days)

Before you store your unit for the off-season, read the Maintenance and Storage instructions in the Safety Rules section, then perform the following steps:

- Drain crankcase oil while engine is hot and refill with a grade of oil that will be required when unit is used again.
- Prepare the mower deck for storage as follows:
  a. Remove mower deck from the unit.
  b. Clean underside of mower deck.
  c. Coat all bare metal surfaces with paint or light coat of oil to prevent rusting.
- Clean external surfaces and engine.
- Prepare engine for storage. See engine owner's manual.
- Clean any dirt or grass from cylinder head cooling fins, engine housing and air cleaner element.
- Cover air cleaner and exhaust outlet tightly with plastic or other waterproof material to keep out moisture, dirt and insects.
- Completely grease and oil unit as outlined in the Normal Care section.
- Clean up unit and apply paint or rust preventative to any areas where paint is chipped or damaged.

⚠ WARNING

Never store the unit, with gasoline in engine or fuel tank, in a heated shelter or in enclosed, poorly ventilated enclosures. Gasoline fumes may reach an open flame, spark or pilot light (such as a furnace, water heater, clothes dryer, etc.) and cause an explosion.

Handle gasoline carefully. It is highly flammable and careless use could result in serious fire damage to your person or property.

Drain fuel into an approved container outdoors away from open flame or sparks.

- Drain fuel system completely or add a gasoline stabilizer to the fuel system. If you have chosen to use a fuel stabilizer and have not drained the fuel system, follow all safety instructions and storage precautions in this manual to prevent the possibility of fire from the ignition of gasoline fumes. Remember, gasoline fumes can travel to distant sources of ignition and ignite, causing risk of explosion and fire.

NOTE: Gasoline, if permitted to stand unused for extended periods (30 days or more), may develop gummy deposits which can adversely affect the engine carburetor and cause engine malfunction. To avoid this condition, add a gasoline stabilizer to the fuel tank and run the engine a few minutes, or drain all fuel from the unit before placing it in storage.

STARTING AFTER LONG TERM STORAGE

Before starting the unit after it has been stored for a long period of time, perform the following steps.

- Remove any blocks from under the unit.
- Unplug the exhaust outlet and air cleaner.
- Fill the fuel tank with fresh gasoline. See engine manual for recommendations.
- See engine owner's manual and follow all instructions for preparing engine after storage.
- Check crankcase oil level and add proper oil if necessary. If any condensation has developed during storage, drain crankcase oil and refill.
- Inflate tires to proper pressure. Check fluid levels.
- Start the engine and let it run slowly. DO NOT run at high speed immediately after starting. Be sure to run engine only outdoors or in well ventilated area.

MAINTENANCE SCHEDULE & PROCEDURES

The following schedule should be followed for normal care of your rider and mower. You will need to keep a record of your operating time. Determining operating time is easily accomplished by multiplying the time it takes to do one job by the number of times you've done the job, or you can install an hour meter.

SAFETY ITEMS	Before Each Use	Every 5 Hours	Every 25 Hours	Every 50 Hours	Every 100 Hours	Every 250 Hours	Spring and Fall
Check Safety Interlock System	●						●
Check Mower Blade Stopping Time	●				●		
TRACTOR CARE ITEMS	**Before Each Use**	**Every 5 Hours**	**Every 25 Hours**	**Every 50 Hours**	**Every 100 Hours**	**Every 250 Hours**	**Spring and Fall**
Check Mower for loose hardware	●	●					
Check / Adjust PTO Clutch			***		●		
Lubricate Mower **					●		
Clean Battery & Cables					●		
Check Tire Pressure	●		●				
Clean Deck & Check/Replace Mower Blades					●		
ENGINE CARE ITEMS	**Before Each Use**	**Every 5 Hours**	**Every 25 Hours**	**Every 50 Hours**	**Every 100 Hours**	**Every 250 Hours**	**Spring and Fall**
Check Engine Oil Level	●						
Check / Clean Engine Cooling Fins			●**				
Check / Change Engine Air Filter *			●**				
Change Engine Oil & Filter *			●				
Inspect Spark Plug(s) *					●		
Check / Replace Fuel Filter *					●		

* Refer to engine owner's manual. Change original engine oil after initial break-in period.
** More often in hot (over 85° F: 30° C) weather or dusty operating conditions.
*** Service after the first 25 hours, then after every 100 hours of operation.

CHECK TIRE PRESSURE

Tire Pressure should be checked periodically, and maintained at the levels shown in the chart. Note that these pressures may differ slightly from the "Max Inflation" stamped on the side-wall of the tires. The pressures shown provide proper traction, improve cut quality, and extend tire life.

Tire	Pressure
Front	25 psi (1,72 bar)
Rear	15 psi (1,03 bar)

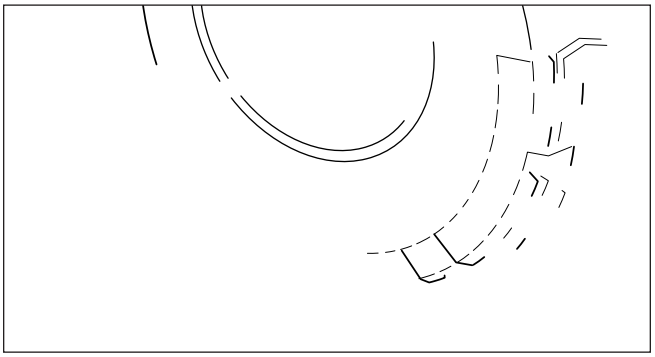


Figure 5. Checking Tire Pressure

CHECKING / ADDING FUEL

To add fuel:

- Remove the fuel cap.
- Fill the tank.

  Do not overfill. Leave approximately 1" of room in the tank for fuel expansion. Refer to your engine manual for specific fuel recommendations.
- Install and hand tighten the fuel cap.

FUEL FILTER

The fuel filter is located in the fuel line between the fuel shut off valve and the fuel pump. If filter is dirty or clogged, replace as follows:

- Shut off the fuel valve.
- Place a container below the filter to catch spilled fuel.
- Using pliers, open and slide hose clamps from fuel filter.
- Remove hoses from filter.
- Install new filter in proper flow direction in fuel line.
- Secure with hose clamps.

OIL & FILTER CHANGE

1. Warm engine by running for a few minutes. (Refer to the engine operator's manual for oil & filter replacement instructions.)
2. Park machine and place the rear tires in a 2 x 4 block of wood or park machine on a slight downhill grade. (See Figure 6)
3. Place a small pan under the oil drain hose (B, Figure 7) to catch the oil.
4. Using a 10mm combination wrench or a large slotted screwdriver, turn the oil drain valve (A) counterclockwise to open the valve and drain the engine oil.
5. After draining, turn the oil drain valve (A) clockwise to close the valve and wipe up any spilled oil.
6. Place a small pan or cup under the engine oil filter.
7. Remove the engine oil filter and replace with a new one.
8. Remove the pan or cup and wipe up any spilled oil.

CHECK / CHANGE AIR FILTER

Refer to engine owners manual.

REPLACE SPARK PLUG

Refer to engine owners manual.

⚠ WARNING

Gasoline is highly flammable and must be handled with care. Never fill the tank when the engine is still hot from recent operation. Do not allow open flame, smoking or matches in the area. Avoid over-filling and wipe up any spills.

Do not remove fuel filter when engine is hot, as spilled gasoline may ignite. DO NOT spread hose clamps further than necessary. Ensure clamps grip hoses firmly over filter after installation.

Do not use gasoline containing METHANOL, gasohol containing more than 10% ethanol, gasoline additives, premium gasoline, or white gas because engine/fuel system damage could result.

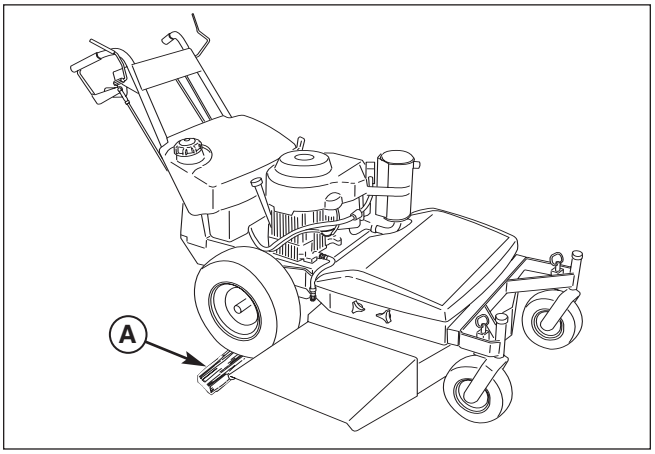


Figure 6. Raise Rear of Machine
A. 2 x 4 Block

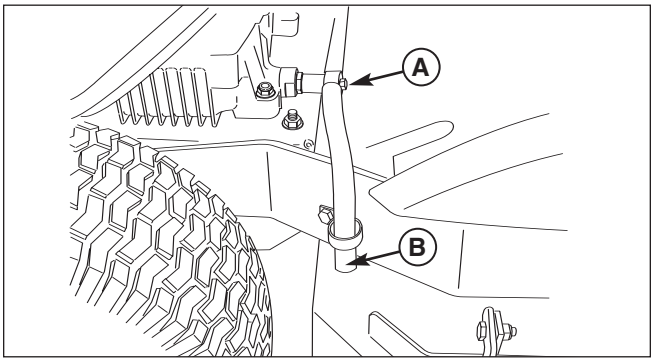


Figure 7. Oil Drain Hose Location
A. Oil Drain Valve
B. Oil Drain Hose

LUBRICATION

Lubricate the unit at the locations shown in Figures 8 through 11 as well as the following lubrication points.

Grease:

- front caster wheel axles
- front caster wheel pivots
- ground speed control shaft pivot
- deck lift shaft screw
- mower deck spindles

Use grease fittings when present. Disassemble parts to apply grease to moving parts when grease fittings are not installed.

Not all greases are compatible. Ferris Red Grease (P/N 5022285) is recommended, automotive-type high-temperature, lithium grease may be used when this is not available.

Oil:

- operator presence / parking brake handle pivot
- ground speed control lever pivots
- discharge chute pivots
- cutting height adjust handle pivots
- deck lift pivots

Generally, all moving metal parts should be oiled where contact is made with other parts. Keep oil and grease off belts and pulleys. Remember to wipe fittings and surfaces clean both before and after lubrication.

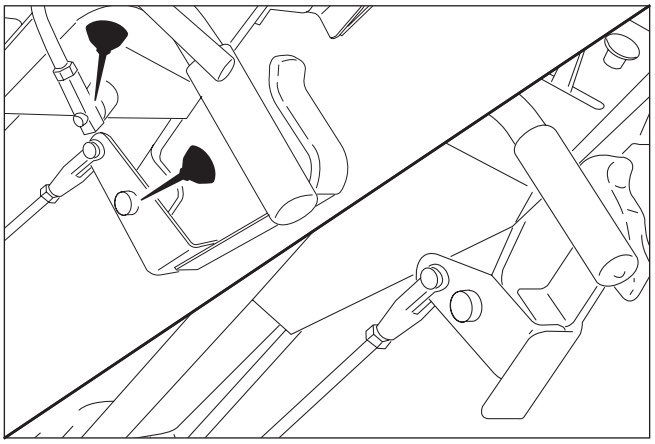


Figure 8. Control Pivots

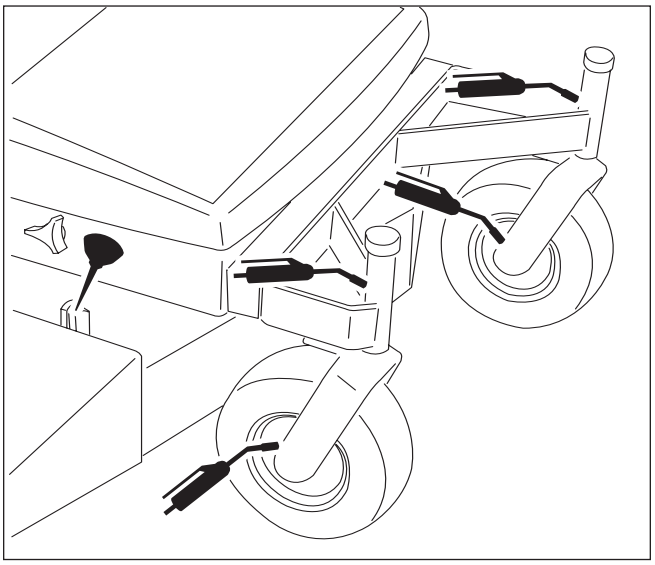


Figure 9. Casters & Chute Hinges

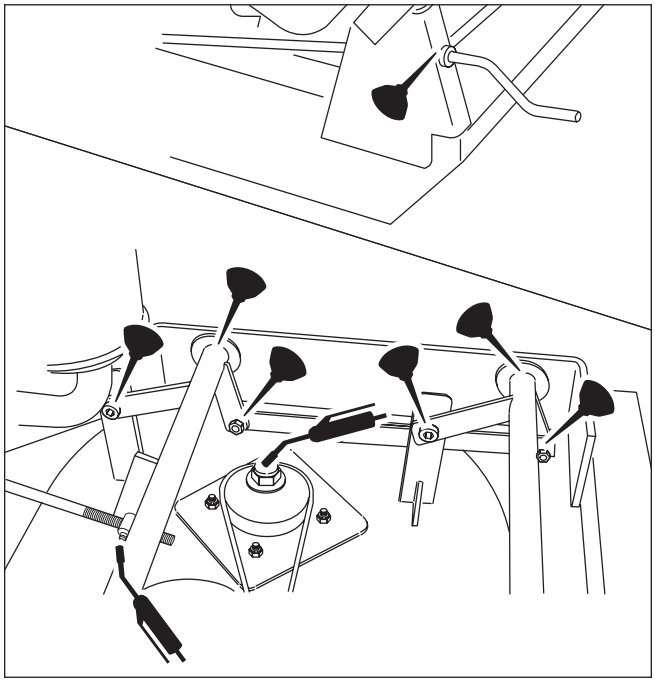


Figure 10. Deck Lift Pivots & Handle

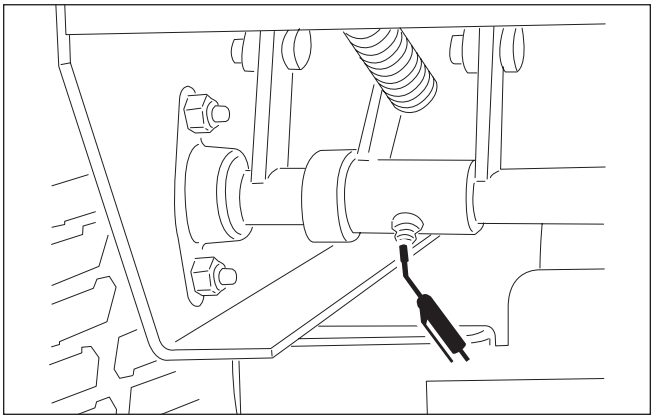


Figure 11. Brake Link Pivot (rear shield removed for clarity)

SERVICING THE MOWER BLADES

Blades should be sharp and free of nicks and dents. If not, sharpen blades as described in following steps.

1. ***32" Model:*** To remove blade for sharpening, use a 1" wrench on the flats of the spindle shaft while removing the blade mounting bolt with a 15/16" wrench (Figure 12).
1. ***36" Model:*** To remove blade for sharpening, use a block of wood to prevent to blade from rotating while removing the blade mounting bolt with a 15/16" wrench (Figure 12).
2. Use a file to sharpen blade to fine edge. Remove all nicks and dents in blade edge. If blade is severely damaged, it should be replaced.
3. Balance the blade as shown in Figure 13. Center the blade's hole on a nail lubricated with a drop of oil. A balanced blade will remain level.
4. Reinstall each blade with the tabs pointing up toward deck as shown in Figure 14. For the 36" model, make sure the blade is firmly seated in the blade saddle. Secure with a bolt and flat washer and torque bolts to 70 ft.lbs. (94 N.m.).

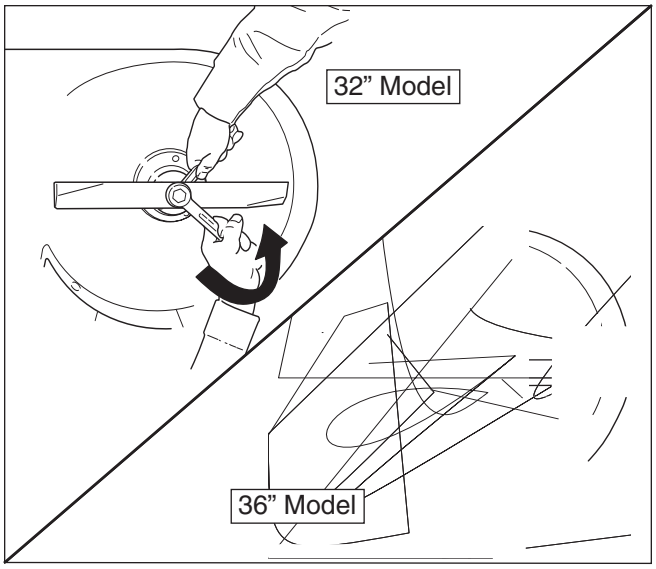


Figure 12. Removing the Blade

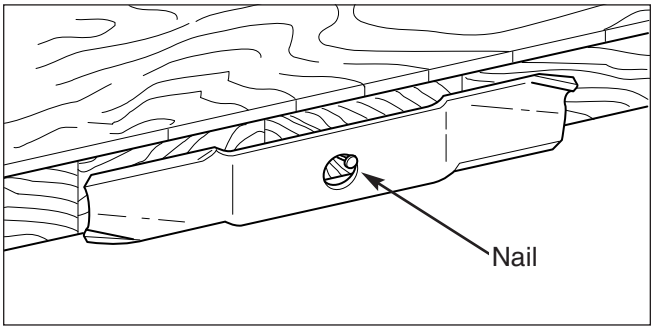


Figure 13. Balancing The Blade

⚠ WARNING

Mower blades are sharp. For your personal safety, do not handle mower blades with bare hands. Careless or improper handling of blades may result in serious injury. For your personal safety, blade mounting bolts must each be installed with a flat washer then securely tightened. Torque blade mounting bolts to 70 ft.lbs. (94 N.m.)

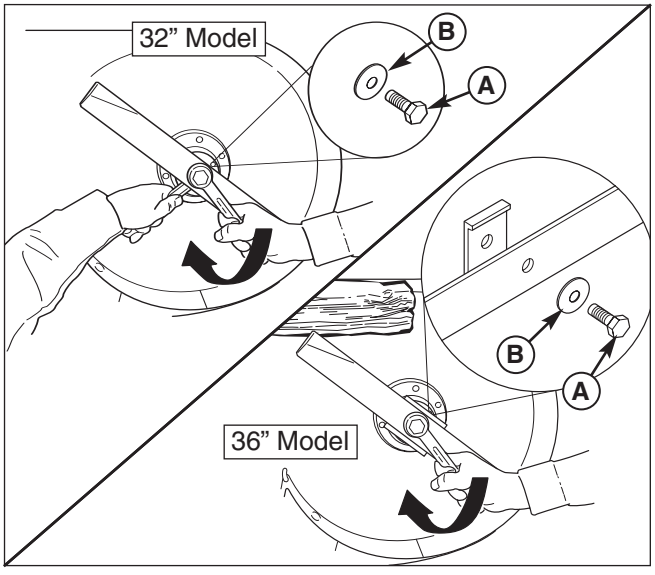


Figure 14. Installing The Blade
A. Bolt
B. Flat Washer

TROUBLESHOOTING

While normal care and regular maintenance will extend the life of your equipment, prolonged or constant use may eventually require that service be performed to allow it to continue operating properly.

The troubleshooting guide below lists the most common problems, their causes and remedies.

See the information on the following pages for instructions on how to perform most of these minor adjustments and service repairs yourself. If you prefer, all of these procedures can be performed for you by your local authorized dealer.

⚠ WARNING

To avoid serious injury, perform maintenance on the tractor or mower only when the engine is stopped and the parking brake engaged.

Always remove the ignition key, disconnect the spark plug wire and fasten it away from the plug before beginning the maintenance, to prevent accidental starting of the engine.

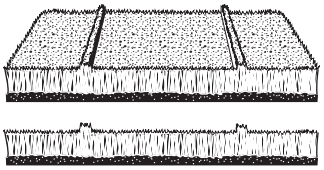
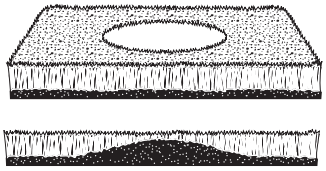
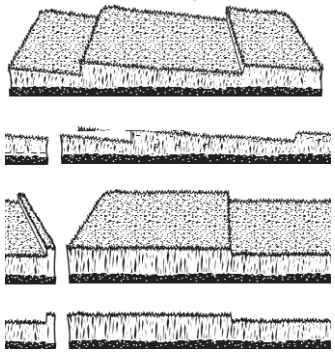
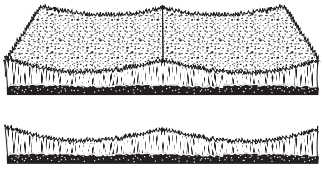
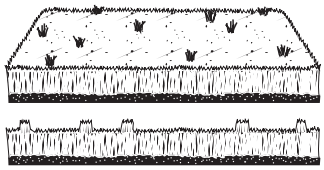
TROUBLESHOOTING THE MOWER

PROBLEM	CAUSE	REMEDY
Engine will not turnover or start.	1. PTO (electric clutch) switch in ON position.	1. Place in OFF position.
	2. Parking brake is disengaged.	2. Engage the parking brake.
	3. Out of fuel.	3. If engine is hot, allow it to cool, then refill the fuel tank.
	4. Engine flooded.	4. Move throttle control out of CHOKE position.
	5. Wiring loose or broken.	5. Visually check wiring & replace broken or frayed wires. Tighten loose connections.
	6. Safety interlock switch faulty.	6. Replace as needed. See authorized service dealer.
	7. Spark plug(s) faulty, fouled or incorrectly gapped.	7. Clean and gap or replace. See engine manual.
	8. Water in fuel.	8. Drain fuel & replace with fresh fuel.
	9. Gas is old or stale.	9. Drain fuel & replace with fresh fuel.
Engine starts hard or runs poorly.	1. Fuel mixture too rich.	1. Clean air filter. Check choke adjustment (throttle control).
	2. Spark plug faulty, fouled, or incorrectly gapped.	2. Clean and gap or replace. (See engine manual.)
Engine knocks.	1. Low oil level.	1. Check/add oil as required.
	2. Using wrong grade oil.	2. See engine manual.
Excessive oil consumption.	1. Engine running too hot.	1. Clean engine fins, blower screen and air cleaner.
	2. Using wrong weight oil.	2. See engine manual.
	3. Too much oil in crankcase.	3. Drain excess oil.
Engine exhaust is black.	1. Dirty air filter.	1. Replace air filter. See engine manual.
	2. Engine choke control is in closed position.	2. Open choke control.
Engine runs, but mower will not drive.	1. Hydraulic release valve rod in “open” position.	1. Return release rod to DRIVE position.
	2. Belt is broken.	2. See Drive Belt Replacement.
	3. Drive belt slips.	3. See problem and cause below.
	4. Brake is not fully released.	4. See authorized service dealer
Brake will not hold.	1. Brake is incorrectly adjusted.	1. See authorized service dealer.
Mower drives or handles poorly.	1. Loose control linkages.	1. Check and tighten any loose connections.
	2. Improper tire inflation.	2. See Regular Maintenance Section.

TROUBLESHOOTING THE MOWER DECK

PROBLEM	CAUSE	REMEDY
Mower drive belt slips or fails to drive.	1. Clutch is out of adjustment. 2. Pulleys or belt greasy or oily. 3. Idler pulley spring broken or not properly attached. 4. Belt stretched or worn. 5. Mower drive belt broken.	1. See PTO Clutch Adjustment Section. 2. Clean as required. 3. Repair or replace as needed. 4. Replace drive belt. 5. Replace drive belt.
Engine stalls easily with mower engaged.	1. Engine speed too slow. 2. Ground speed too fast. 3. Cutting height set too low. 4. Discharge chute plugged with cut grass.	1. Set to full throttle. 2. Decrease Ground Speed. 3. Cut tall grass at maximum cutting height during first pass. 4. Cut grass with discharge pointing toward previously cut area.
Excessive mower vibration.	1. Blade mounting screws are loose. 2. Mower blades, arbors, or pulleys are bent. 3. Mower blades are out of balance. 4. Belt installed incorrectly.	1. Tighten to 70 ft.lbs. (94 N.m.). 2. Check and replace as necessary. 3. Remove, sharpen, and balance blades. See Maintenance Section. 4. Reinstall Correctly.
Excessive belt wear or breakage.	1. Bent or rough pulleys. 2. Using incorrect belt.	1. Repair or replace. 2. Replace with correct belt.

TROUBLESHOOTING COMMON CUTTING PROBLEMS

PROBLEM	CAUSE	REMEDY
Streaking. 	1. Blades are not sharp. 2. Blades are worn down to far. 3. Engine speed is too slow. 4. Ground speed is too fast. 5. Deck is plugged with grass 6. Not overlapping cutting rows enough. 7. Not overlapping enough when turning.	1. Sharpen your blades. 2. Replace your blades. 3. Always mow at full throttle. 4. Slow down. 5. Clean out the mower. 6. Overlap your cutting rows. 7. When turning your effective cutting width decreases–overlap more when turning.
Scalping. 	1. Lawn is uneven or bumpy. 2. Mower deck cutting height is set too low. 3. Ground speed is too fast. 4. Deck is not leveled correctly. 5. Tire pressure is low or uneven	1. Roll or level the lawn. 2. Raise the cutting height. 3. Slow down. 4. Correctly level the deck. 5. Check and inflate the tires.
Stepped Cutting. 	1. Deck is not leveled correctly. 2. Tires are not properly inflated. 3. Blades are damaged. 4. Deck shell is damaged. 5. Mower spindle is bent or loose. 6. Blades are installed incorrectly.	1. Level the deck correctly. 2. Check and inflate the tires. 3. Replace the blades. 4. Repair or replace the deck. 5. Repair or replace the spindle. 6. Reinstall the blades correctly.
Uneven Cutting. 	1. Deck is not leveled correctly. 2. Blades are dull or worn. 3. Blades are damaged. 4. Deck is clogged with grass clippings. 5. Deck shell is damaged. 6. Mower spindle is bent or loose. 7. Blades are installed incorrectly. 8. Tires are not properly inflated.	1. Level the deck correctly. 2. Sharpen or replace the blades. 3. Replace the blades. 4. Clean out the deck. 5. Repair or replace the deck. 6. Repair or replace the spindle. 7. Reinstall the blades correctly. 8. Check and inflate the tires.
Stingers. 	1. Blades are not sharp or nicked. 2. Blades are worn down too far. 3. Engine speed is too slow. 4. Ground speed is too fast. 5. Deck is plugged with grass.	1. Sharpen your blades. 2. Replace your blades. 3. Always mow at full throttle. 4. Slow down. 5. Clean out the mower.

CUTTING HEIGHT ADJUSTMENT

The cutting height can be adjusted within two different ranges. See Figure 15 for deck height indicator.

Before adjusting the cutting height, you must first determine the average cutting height. Depending on the range you plan to use, it may be necessary to adjust the deck lift pivot locations and the pulley spacer positions. See Figures 16,17 & 18 for pulley and pivot positions in relation to the cutting range.

To Adjust the Cutting Range:

1. Remove the mower deck drive belt. See Belt Removal & Replacement Section for proper procedure.
2. Remove the spindle nut (B, Figure 18) fastening the pulley to the spindle. Remove the pulley and key. Move the pulley spacers into the proper position in relation to the cutting range. Reinstall the pulley and key. Reinstall the nut and torque to 85-90 ft. lbs. (115-122 Nm).
3. Remove the pivot bolts and nuts (A, Figure 18) and reinstall at the proper position in relation to the cutting range. Reinstall the bolts and nuts and tighten securely.
4. Reinstall the mower deck drive belt. See Belt Removal & Replacement Section for proper procedure.

To Adjust the Cutting Height:

Turn the crank handle clockwise to raise the mower deck or counterclockwise to lower the mower deck. See Figure 19.

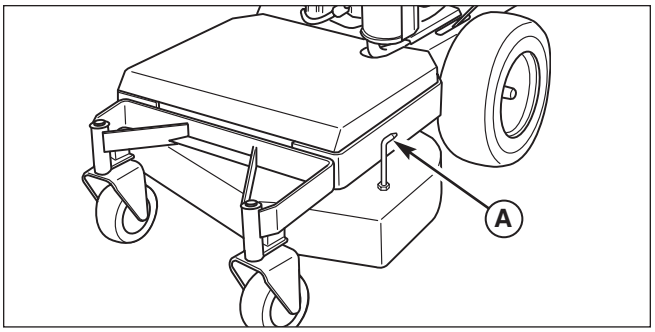


Figure 15. Deck Height Indicator
A. Height Indicator Pin

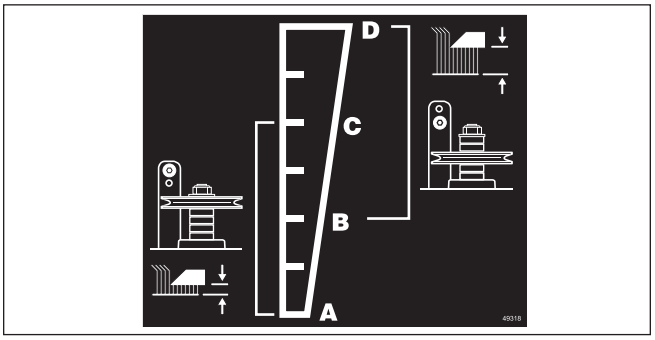


Figure 16. Deck Height, Pulley & Pivot Position (32" Model)

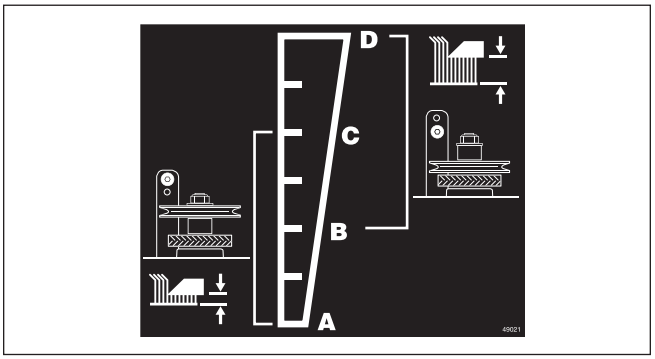


Figure 17. Deck Height, Pulley & Pivot Position (36" Model)

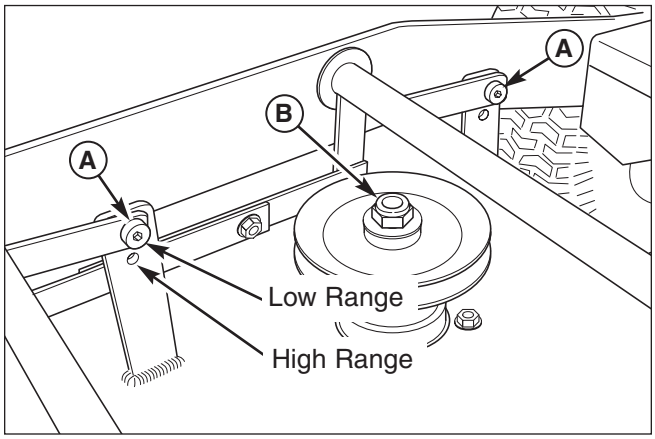


Figure 18. Pulley & Pivot Position
A. Pivot Bolts & Nuts
B. Spindle Nut

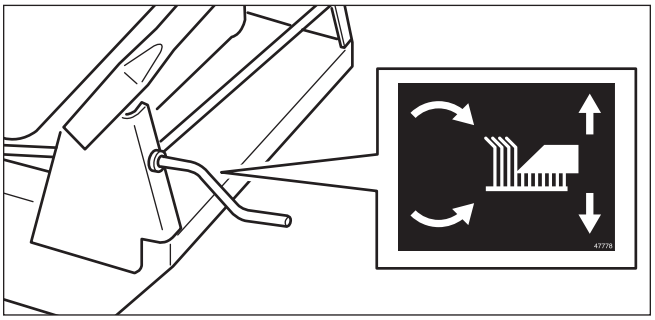


Figure 19. Cutting Height Adjustment

DECK LEVELING ADJUSTMENT

To Level the Mower Deck:

1. Park machine on a flat, level surface.
2. Raise the mower deck until it reaches the upper stop.

3A. If the mower deck is in the HIGH RANGE, place 2 x 4 blocks under the outside edges of the mower deck with the 3-1/2" sides being vertical. Place a 1/8" (3mm) thick spacer on top of the rear 2 x 4 blocks. (See Figure 20)

3B. If the mower deck is in the LOW RANGE, place 2 x 4 blocks under the outside edges of the mower deck with the 1-1/2" sides being vertical. Place a 1/8" (3mm) thick spacer on top of the rear 2 x 4 blocks. (See Figure 20)

4. Lower the mower deck until the deck rests against the 2 x 4 blocks and spacers.
5. Loosen the bolts (A, Figure 21) that secure the connecting links (B) together. This will remove any tension from the mounting linkages and pivots.
6. Retighten the bolts securely.
7. Verify that the deck height indicator (C) is aligned with the 4" mark (if in the HIGH RANGE) or the 2" mark (if in the LOW RANGE). Adjust the indicator position if necessary.
8. Remove the blocks from under the mower deck.

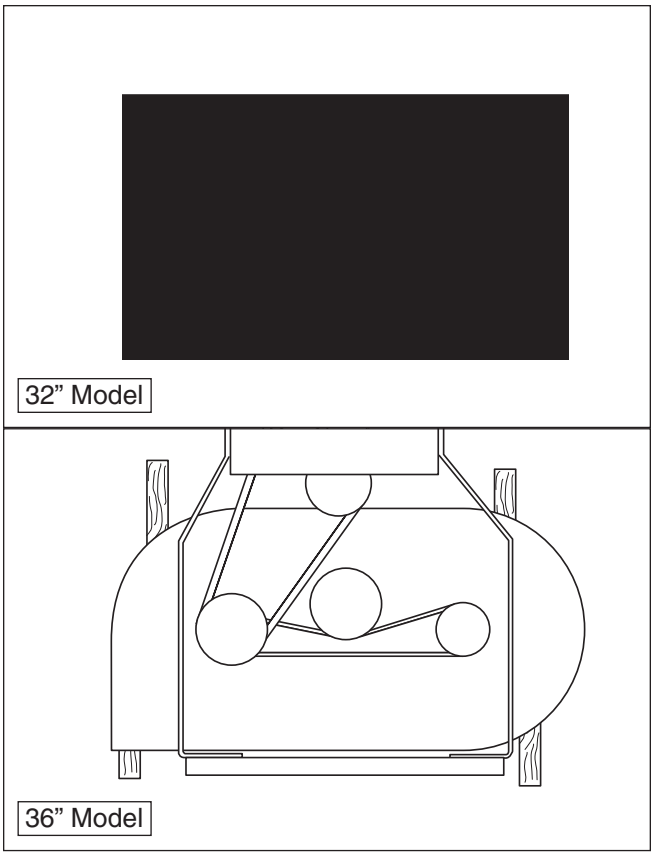


Figure 20. 2 x 4 Placement

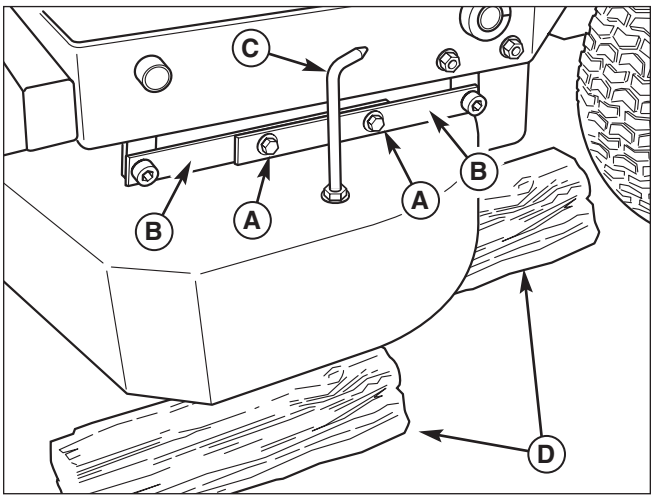


Figure 21. Deck Leveling Linkages
A. Linkage Bolts
B. Connecting Links
C. Deck Height Indicator
D. 2 x 4 Blocks

BELT REMOVAL AND REPLACEMENT

Mower Deck Drive Belt (32" Model)

1. Park machine on a flat, level surface.
2. Remove the mower deck shield.
3. Push the idler arm towards the left-hand side of the machine (non-discharge side) to release the spring tension on the drive belt. (See Figure 22)
4. Slide the drive belt over the edge of the idler pulley (A). Release the idler arm.
5. Remove the old belt and replace with a new one. Make sure the V-side of the belt runs in the pulley grooves.
6. Install the drive belt on the spindle pulleys and the PTO clutch pulley. Again, push the idler arm towards the left-hand side of the machine and install the belt onto the idler pulley (A).
7. Run the mower under no-load condition for about 5 minutes to break in the belt.

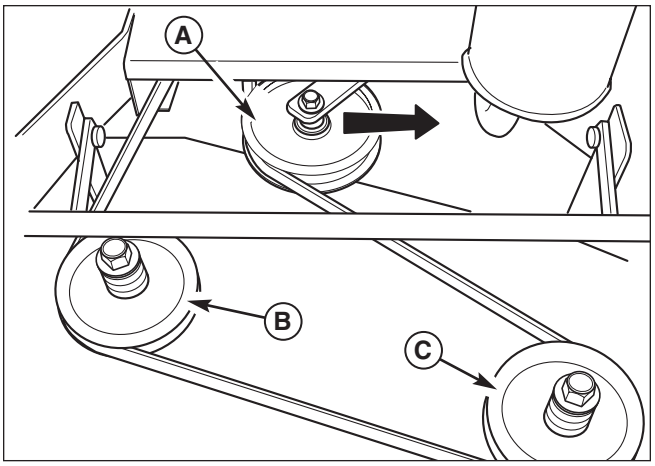


Figure 22. Mower Deck Drive Belt (32" Model)
A. Idler Pulley
B. Right-Hand Spindle Pulley
C. Left-Hand Spindle Pulley

Mower Deck Drive Belt (36" Model)

1. Park machine on a flat, level surface.
2. Remove the mower deck shield.
3. Push the idler arm towards the right-hand side of the machine (discharge side) to release the spring tension on the drive belt. (See Figure 23)
4. Slide the drive belt over the edge of the v-groove spindle pulley (B). Release the idler arm.
5. Remove the old belt and replace with a new one. Make sure the V-side of the belt runs in the pulley grooves.
6. Install the drive belt on the idler pulley (A) and the PTO clutch pulley. Again, push the idler arm towards the right-hand side of the machine and install the belt onto the v-groove spindle pulley (B).
7. Run the mower under no-load condition for about 5 minutes to break in the belt.

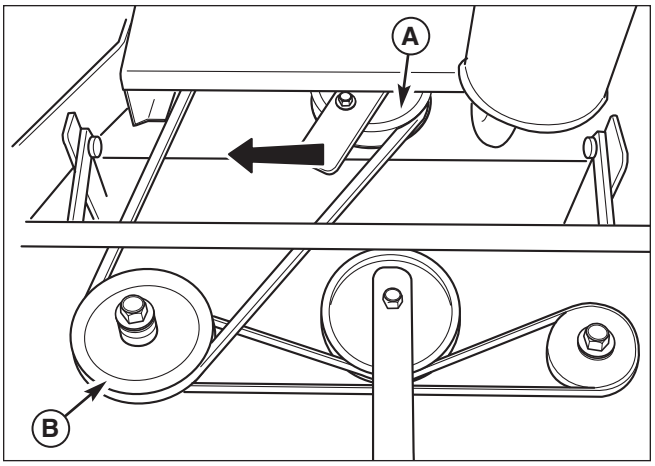


Figure 23. Mower Deck Drive Belt (36" Model)
A. Idler Pulley
B. V-Groove Spindle Pulley

Spindle Belt & Blade Alignment (36" Model)

1. Remove the mower deck drive belt.
2. Loosen the idler pulley bolt (A, Figure 24) 2 full turns. DO NOT remove the nut.
3. Remove the spring compression nut and flat washer (G) and slide the idler mount (C) towards the rear of the machine to remove all tension from the belt.
4. Remove the old belt and replace with a new one. Install the new belt on the RH sprocket (E) and make sure the belt is properly seated in the chevron of the sprocket.
5. Refer to Figure 25. Align the holes in the sprockets with the spindle mounting hardware as shown. The blades will be perpendicular to each other.
6. Install the new belt on the LH sprocket (D), again making sure the belt is properly seated.
7. Reinstall the flat washer and spring compression nut (G). Tighten the nut until the belt tension spring (F) is compressed to 1-1/2" (3,81 cm) long.
8. Tighten the idler pulley bolt (A) and torque to 55 ft. lbs. (74.5 Nm).
9. Reinstall the mower deck drive belt.

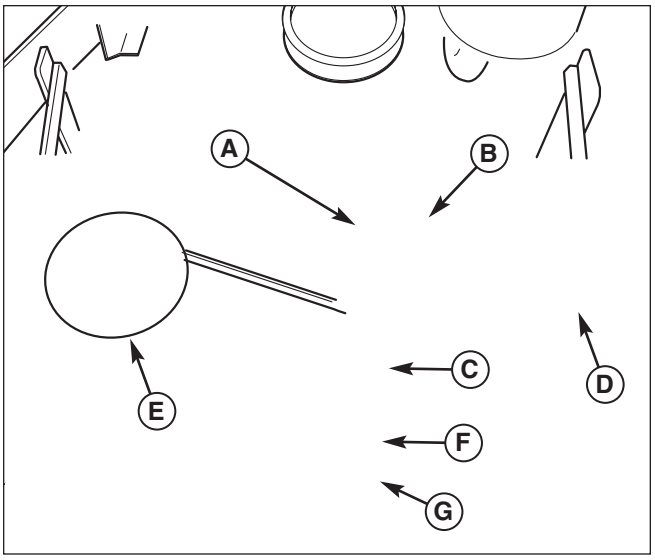


Figure 24. Mower Deck Drive Belt
A. Idler Pulley Bolt
B. Idler Pulley
C. Idler Mount
D. LH Sprocket
E. RH Sprocket (hidden under spindle pulley)
F. Belt Tension Spring
G. Spring Compression Nut & Washer

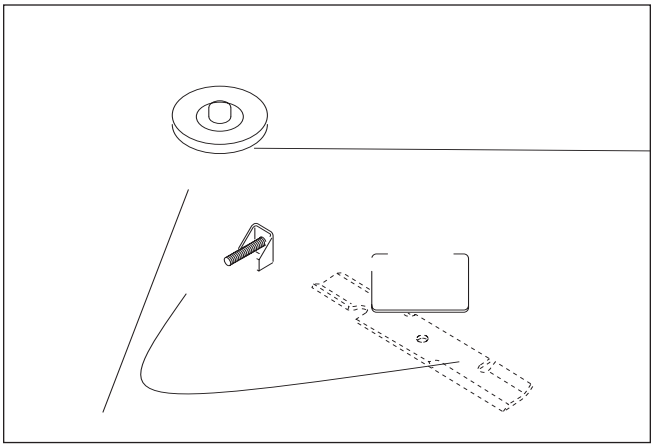


Figure 25. Align Sprockets & Blades

Transaxle Drive Belt

1. Park machine on a flat, level surface.
2. Remove the rear shield.
3. Remove the mower deck drive belt from the PTO clutch. See instructions above.
4. With a steel coat hanger, form a small hook. Insert the coat hanger through the opening in the right-hand side of the engine deck. Use the coat hanger to remove the spring (A, Figure 26) from the anchor pin (C).
5. Remove the belt from the idler pulley. Then remove the belt from the transaxle drive pulley and pull towards front of machine. Remove the belt from the drive pulley on the engine and drop belt around the PTO clutch to completely remove from machine.
6. Replace the old belt with a new belt. Install the new belt around the PTO clutch and onto the drive pulley on the engine. Reinstall belt onto the transaxle drive pulley and then onto the idler pulley. Make sure the V-side of the belt runs in the pulley grooves.
7. Using the coat hanger, reinstall the spring onto the anchor pin.
8. Reinstall the rear shield.

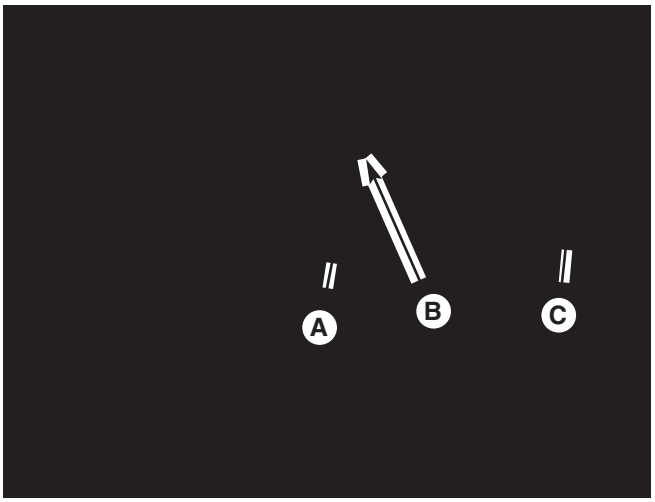


Figure 26. Transaxle Drive Belt
B. Spring
C. Drive Idler Arm
C. Anchor Pin

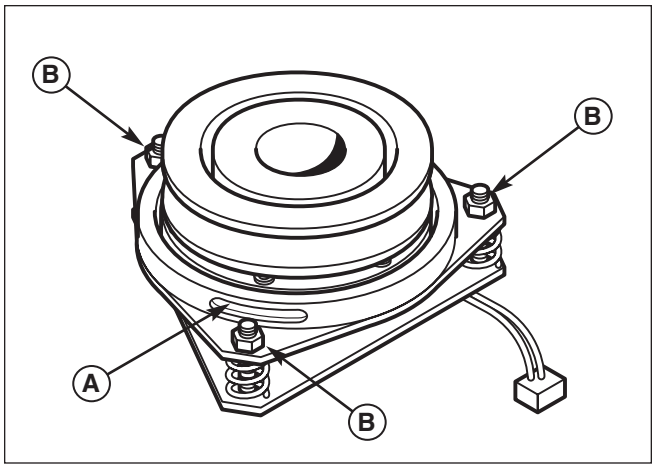


Figure 28. PTO Clutch Adjustment
A. Adjustment Window (Qty. 3, one shown)
B. Adjustment Nut

PTO CLUTCH ADJUSTMENT

Check the PTO clutch adjustment after the initial 25 hour break-in period and then after every 100 hours of operation. Also perform the following procedure if the clutch is slipping or will not engage, or if a new clutch has been installed.

- Remove key from ignition switch and disconnect spark plug wires to prevent the possibility of accidental starting while the PTO is being adjusted.
- See Figure 28. Note the position of the 3 adjustment windows (A) in the side of the brake plate and the nylock adjustment nuts (B).
- Insert a .016"-.018" (0,40-0,45 mm) feeler gauge (C) through each window, positioning the gauge between the rotor face and the armature face as shown in Figure 29.
- Alternately tighten the adjustment nuts (B, Figure 28) until the rotor face and armature face just contacts the gauge.
- Check the windows for an equal amount of tension when the gauge is inserted and removed, and make any necessary adjustments by tightening or loosening the adjustment nuts.

NOTE: The actual air gap between the rotor and armature may vary even after performing the adjustment procedure. This is due to dimensional variations on component parts, and is an acceptable condition.

- Check the mower blade stopping time. The mower blades and mower drive belt should come to a complete stop within seven (7) seconds after the electric PTO switch is turned off.

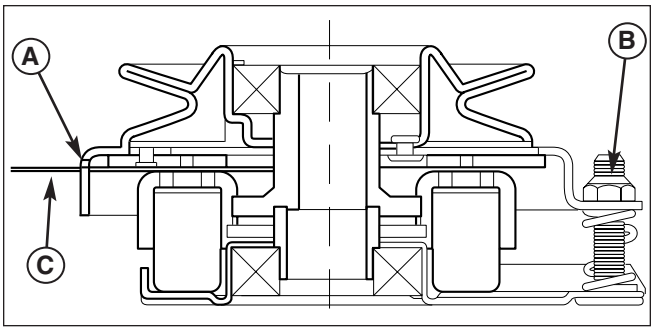


Figure 29. Adjust PTO Clutch
A. Window
B. Adjustment Nut
C. .016"-.018" (0,40-0,45 mm) Feeler Gauge

⚠ WARNING

To avoid serious injury, perform adjustments only with engine stopped, key removed and tractor on level ground.

Blade Brake Check

Mower blades and mower drive belt should come to a complete stop within seven (7) seconds after electric PTO switch is turned off.

- With PTO disengaged, start the engine.
- Remove the mower deck guard and observe the mower drive belt. Engage the PTO and wait several seconds. Disengage the PTO and check the amount of time it takes for the mower drive belt to stop.
- If the mower drive belt does not stop within seven (7) seconds, perform the PTO Clutch Adjustment. If the belt still does not stop within seven (7) seconds, see your dealer.

BATTERY SERVICE

⚠ WARNING

Keep open flames and sparks away from the battery; the gasses coming from it are highly explosive. Ventilate the battery well during charging.

Checking Battery Voltage

A voltmeter can be used to determine condition of battery. When engine is off, the voltmeter shows battery voltage, which should be 12 volts. When engine is running, the voltmeter shows voltage of charging circuit which normally is 13 to 14 volts.

A dead battery or one too weak to start the engine may not mean the battery needs to be replaced. For example, it may mean that the alternator is not charging the battery properly. If there is any doubt about the cause of the problem, see your dealer. If you need to replace the battery, follow the steps under Cleaning the Battery & Cables in the Regular Maintenance Section.

Charging a Completely Discharged Battery

1. Be aware of all the safety precautions you should observe during the charging operation. If you are unfamiliar with the use of a battery charger and hydrometer, have the battery serviced by your dealer.
2. Add distilled water sufficient to cover the plate (fill to the proper level near the end of the charge). If the battery is extremely cold, allow it to warm before adding water because the water level will rise as it warms. Also, an extremely cold battery will not accept a normal charge until it becomes warm.
3. Always unplug or turn the charger off before attaching or removing the clamp connections.
4. Carefully attach the clamps to the battery in proper polarity (usually red to [+] positive and black to [-] negative).
5. While charging, periodically measure the temperature of the electrolyte. If the temperature exceeds 125° F (51.6° C), or if violent gassing or spewing of electrolyte occurs, the charging rate must be reduced or temporarily halted to prevent battery damage.
6. Charge the battery until fully charged (until the specific gravity of the electrolyte is 1.250 or higher and the electrolyte temperature is at least 60° F). The best method of making certain a battery is fully charged, but not over charged, is to measure the specific gravity of a cell once per hour. The battery is fully charged when the cells are gassing freely at low charging rate and less than 0.003 change in specific gravity occurs over a three hour period.

Jump Starting With Auxiliary (Booster) Battery

Jump starting is not recommended. However, if it must be done, follow these directions. Both booster and dis-charged batteries should be treated carefully when using jumper cables. Follow the steps below EXACTLY, being careful not to cause sparks. Refer to Figure 30.

1. Both batteries must be of the same voltage.
2. Position the vehicle with the booster battery adjacent to the vehicle with the discharged battery so that booster cables can be connected easily to the batteries in both vehicles. Make certain vehicles do not touch each other.
3. Wear safety glasses and shield eyes and face from batteries at all times. Be sure vent caps are tight. Place damp cloth over vent caps on both batteries.
4. Connect positive (+) cable to positive post of discharged battery (wired to starter or solenoid).
5. Connect the other end of same cable to same post marked positive (+) on booster battery.
6. Connect the second cable negative (-) to other post of booster battery.
7. Make final connection on engine block of stalled vehicle away from battery. Do not lean over batteries.
8. Start the engine of the vehicle with the booster battery. Wait a few minutes, then attempt to start the engine of the vehicle with the discharged battery.
9. If the vehicle does not start after cranking for thirty seconds, STOP PROCEDURE. More than thirty seconds seldom starts the engine unless some mechanical adjustment is made.
10. After starting, allow the engine to return to idle speed. Remove the cable connection at the engine or frame. Then remove the other end of the same cable from the booster battery.
11. Remove the other cable by disconnecting at the discharged battery first and then disconnect the opposite end from the booster battery.
12. Discard the damp cloths that were placed over the battery vent caps.

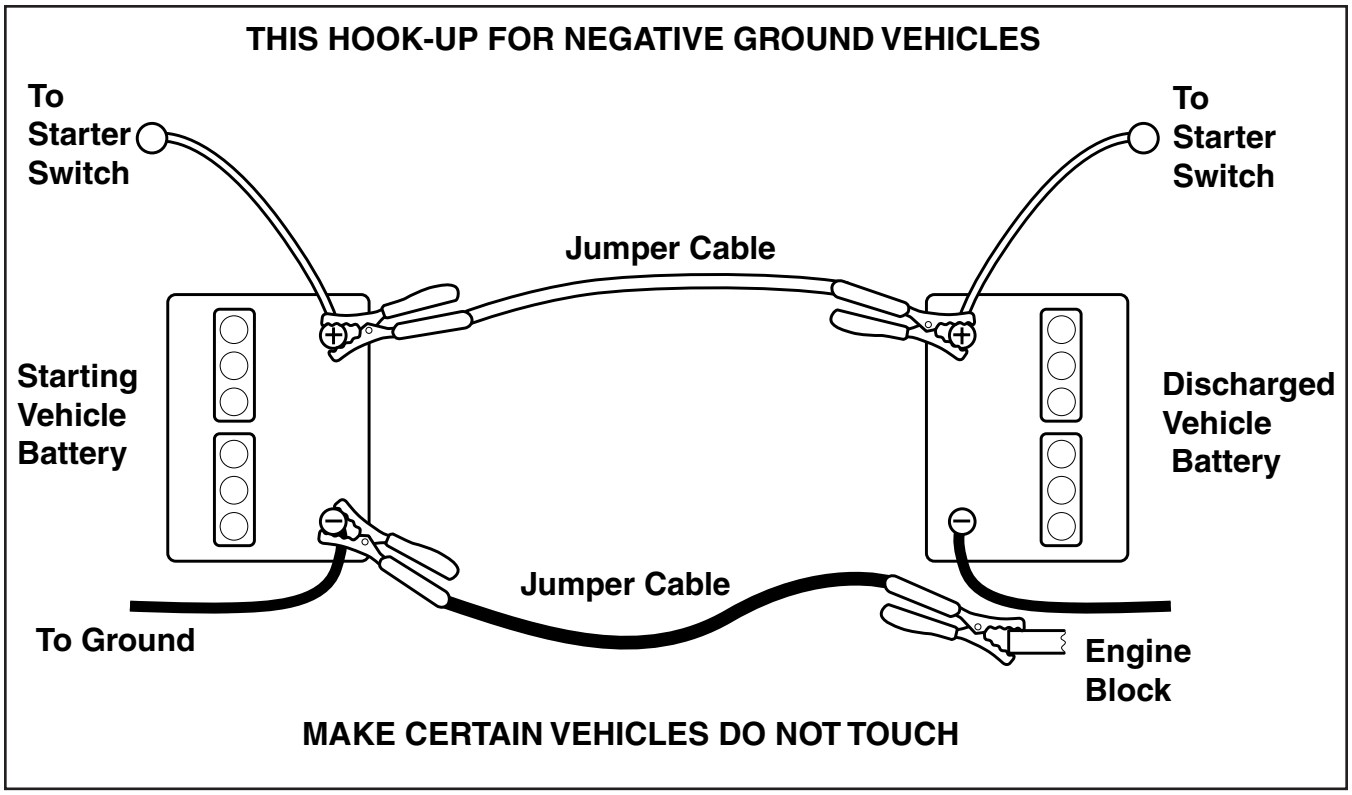


Figure 30. Jump Starting

⚠ WARNING

Any procedure other than the preceding could result in:

(1) personal injury caused by electrolyte squirting out the battery vents,

(2) personal injury or property damage due to battery explosion,

(3) damage to the charging system of the booster vehicle or of the immobilized vehicle.

Do not attempt to jump start a vehicle having a frozen battery because the battery may rupture or explode. If a frozen battery is suspected, examine all fill vents on the battery. If ice can be seen or if the electrolyte fluid cannot be seen, do not attempt to start with jumper cables as long as the battery remains frozen.

⚠ WARNING

For your personal safety, use extreme care when jump starting. Never expose battery to open flame or electric spark – battery action generates hydrogen gas which is flammable and explosive. Do not allow battery acid to contact skin, eyes, fabrics, or painted surfaces. Batteries contain a sulfuric acid solution which can cause serious personal injury or property damage.

When removing or installing battery cables, disconnect the negative cable FIRST and reconnect it LAST. If not done in this order, the positive terminal can be shorted to the frame by a tool.

To avoid engine damage, do not disconnect battery while engine is running. Be sure terminal connections are tight before starting.

NOTE: Specifications are correct at time of printing and are subject to change without notice.

ENGINE:

13 HP* Kawasaki Manual Start

Make	Kawasaki
Model	FH381V
Horsepower	13 @ 3600 rpm
Displacement	26.30 Cu. in (431 cc)
Electrical System	12 Volt Clutch Coil, 13 amp
Oil Capacity	3.2 pt. (1.5L) w/ Filter

13 HP* Kawasaki Electric Start

Make	Kawasaki
Model	FH381V
Horsepower	13 @ 3600 rpm
Displacement	26.30 Cu. in (431 cc)
Electrical System	12 Volt Clutch Coil, 13 amp
Oil Capacity	3.2 pt. (1.5L) w/ Filter

CHASSIS:

Fuel Tanks	Capacity: 4 Gallons (15.1 L)
Rear Wheels	Tire Size: 16 x 6.50 -12
	Inflation Pressure: 15 psi (1,03 bar)
Front Wheels	Tire Size: 9 x 3.5 - 6
	Inflation Pressure: 25 psi (1,72 bar)

TRANSMISSION:

HydroGear 334

Type	Unitized Drive Transaxle
Hydraulic Fluid	HydroGear 20W-50 oil
Speeds	Forward: 0-5.5 MPH (0-8.85 km/h)
@ 3400 rpm	Reverse: 0-2 MPH (0-3.22 km/h)
Continuous Torque Output	160 ft. lbs. (217 N.m.)
Maximum Weight on Axle	620 lbs. (281 Kg)

DIMENSIONS:

32” Model

Overall Length	74” (188 cm)
Overall Width	41” (104 cm)
Height	41” (104 cm)
Weight (apx..)	330 lbs. (150 kg)

36” Model

Overall Length	72” (183 cm)
Overall Width	48” (122 cm)
Height	41” (104 cm)
Weight (apx..)	355 lbs. (161 kg)

Engine Power Rating Information

The gross power rating labels for individual gas engine models meet or exceed SAE (Society of Automotive Engineers) code J1940 (Small Engine Power & Torque Rating Procedure) and rating performance has been obtained and corrected in accordance with SAE J1995 (Revision 2002-05). Actual gross engine power may be lower and is affected by, but not limited to, ambient operating conditions and engine to engine variability. Given both the wide array of products on which engines are placed, and the variety of environmental issues applicable to operating the equipment, the gas engine will not develop the rated gross power when used in a given piece of power equipment (actual “on-site” or net horsepower). This difference is due to a variety of factors including, but not limited to, accessories (air cleaner, exhaust, charging, cooling, carburetor, fuel pump, etc.), application limitations, ambient operating conditions (temperature, humidity, altitude), and engine to engine variability.

Ferris Industries - a division of Simplicity Manufacturing Inc.
Owner's Limited Warranty Information

(Effective 04/28/2004)

Thank you for purchasing Ferris commercial mowing equipment. Please take a few minutes to read this limited warranty information. It contains all the information you will need to have your Ferris mower repaired in the unlikely event that a breakdown covered by this limited warranty should occur.

Owner's Responsibilities - As a condition to our obligations under this limited warranty, you shall have read the operator's manual and you shall have completed and submitted to Ferris, within 20 days from the date of purchase, the Ferris Product Registration. You must properly service and maintain your Ferris product as described in the operator's manual. Such routine maintenance, whether performed by a dealer or by you, is at your expense. The Ferris equipment, including any defective part covered by this limited warranty, must be returned to an authorized Ferris dealer within the warranty period for warranty service. This limited warranty extends only to equipment operated under normal conditions and in accordance with Ferris' instructions.

Warranty Start Date - The limited warranty coverage begins on the day you buy your new Ferris commercial mowing equipment. An authorized Ferris dealer will assist you in filling out a Ferris Product Registration with specific information for the model you purchase and your personal information, which must be returned to Ferris.

Limited Warranty - The limited warranty, set forth below, is a written guarantee by Ferris, during the warranty period, to repair or replace parts which have a substantial defect in materials or workmanship. The warranty is "limited" because it is for a specified period of time, applies to the original purchaser only, and is subject to other restrictions.

FERRIS LIMITED WARRANTY

Ferris Industries (Ferris) warrants, in accordance with the provisions below, to the original purchaser only, for the periods described below that the commercial mower shall be free from substantial defects in material or workmanship under normal use and service. If you wish to file a claim under this limited warranty, you must provide prompt notice of your claim to an authorized Ferris dealer during the warranty period. Ferris' obligation under this limited warranty is, at Ferris' option, to repair or replace any part or parts of the mower, which, in the judgment of Ferris, are found to be defective and covered by this limited warranty. An authorized Ferris dealer will repair or replace the defective part or parts, at the dealer's place of business, at no charge for the labor or parts. This limited warranty applies only to mowers sold in the United States and Canada and is subject to the following limitations.

Covered Parts	**Warranty Period**
All Mowers	2-years (24 months) from date of retail purchase by the original purchaser for parts & labor (90 days for rental mowers) (Except as noted below*)
*Belts, Tires, Brake Pads And Hoses, Battery, Blades	90 days from date of retail purchase by the original purchaser
*Attachments	1 year from date of retail purchase by the original purchaser
*Engine	If the engine manufacturer provides any warranty on the mower's engine, Ferris will assign that warranty to the original purchaser of the mower if such assignment is reasonably practicable. Please refer to the engine manufacturer's warranty statement, if any, that is included in the owner's packet. We are not authorized to handle warranty adjustments or repairs on engines. Ferris offers **NO WARRANTY** on mower engines. Ferris does not guarantee or represent that any engine manufacturer will comply with the terms of its warranty.

Items and Conditions Not Covered

This warranty does not cover, and Ferris makes **NO WARRANTY** regarding, the following:

- Mowers or their parts if a complete and accurate Ferris Product Registration has not been received by Ferris.
- Loss or damage to person or property other than that expressly covered by the terms of this limited warranty.
- Pickup and delivery charges and risk of loss or damage in transit to and from any authorized Ferris dealer.
- Any damage or deterioration due to normal use, wear and tear, or environmental or natural elements, or exposure.
- Cost of regular maintenance service or parts, such as but not limited to, filters, fuel, lubricants, tune-up parts, and adjustments.
- Claims arising due to failure to follow Ferris' written instructions, or improper storage or maintenance.
- Any repairs necessary due to use of parts, accessories or supplies, including gasoline, oil or lubricants, incompatible with the mowing equipment, or other than as recommended in the operator's manual or other written operational instructions provided by Ferris.
- Use of non-Ferris approved parts or accessories.
- Any overtime or other extraordinary repair charges or charges relating to repairs or replacements.
- Rental of like or similar replacement equipment during the period of any warranty, repair or replacement work.
- Loss of revenue, time or use of the mowing equipment.
- Travel, telephone or other communication charges.
- Damage from continued use of defective mowing equipment.
- Freight charges on replacement parts.
- Any mowing equipment or part which, in the judgment of Ferris, has been altered or tampered with in any way or has been subjected to misuse, abuse, abnormal usage, unauthorized repair, neglect or accident, damage in transit, or has had the serial numbers altered, effaced or removed.
- Any equipment, part or item not mentioned under "Covered Parts," above.

General Conditions

Ferris is continually striving to improve its products, and therefore reserves the right to make improvements or changes without incurring any obligation to make changes or additions to products sold previously. Any oral or written description of Ferris products is for the sole purpose of identifying the products and shall not be construed as an express warranty. No warranty claim shall give rise to a right for the purchaser to cancel or rescind any sale. No person is authorized to make any warranty or assume for Ferris any liability not strictly in accordance with this limited warranty. Any assistance Ferris provides to or procures for the purchaser outside the terms, limitations or exclusions of this limited warranty will not constitute a waiver of the terms, limitations or exclusions of this limited warranty, nor will such assistance extend or revive the limited warranty. Ferris will not reimburse the purchaser for any expenses incurred by the purchaser in repairing, correcting or replacing any defective products except for those incurred with Ferris' prior written permission and in accordance with this limited warranty.

Ferris' sole and exclusive liability with respect to this limited warranty, and the purchaser's exclusive remedy, shall be repair or replacement as set forth herein. All warranty work must be performed by an authorized Ferris dealer using only Ferris approved replacement parts. **FERRIS SHALL HAVE NO LIABILITY FOR ANY OTHER COST, LOSS OR DAMAGE, INCLUDING BUT NOT LIMITED TO, ANY INCIDENTAL, COMPENSATORY, INDIRECT, PUNITIVE, SPECIAL OR CONSEQUENTIAL LOSS OR DAMAGE. FERRIS' AGGREGATE LIABILITY WITH RESPECT TO A DEFECTIVE PRODUCT OR PART SHALL BE LIMITED TO AN AMOUNT EQUAL TO THE MONIES PAID BY THE PURCHASER FOR THAT DEFECTIVE PRODUCT OR PART. THIS LIMITED WARRANTY, AND FERRIS' OBLIGATIONS HEREUNDER, ARE EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, WITHOUT LIMITATION, THE IMPLIED WARRANTY OF MERCHANTABILITY AND THE IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE. FERRIS SHALL NOT BE LIABLE TO THE PURCHASER, OR TO ANYONE CLAIMING UNDER THE PURCHASER, FOR ANY OTHER OBLIGATIONS OR LIABILITIES, INCLUDING, BUT NOT LIMITED TO, OBLIGATIONS OR LIABILITIES ARISING OUT OF BREACH OF CONTRACT OR WARRANTY, NEGLIGENCE OR OTHER TORT OR ANY THEORY OF STRICT LIABILITY, WITH RESPECT TO FERRIS PRODUCTS OR FERRIS' ACTS OR OMISSIONS OR OTHERWISE.**

It is the express wish of the parties that this agreement and any related documents be drafted in English. Il est la volonté expresse des parties que cette convention et tous les documents s'y rattachent soient rédigés en anglais.

OPERATOR'S MANUAL

HydroCut Series

Transaxle Drive Walk-Behind Mower

Product Quick Specs:

ENGINE:

13 HP* Kawasaki Manual Start

Make	Kawasaki
Model	FH381V
Oil Capacity	3.2 pt. (1.5L) w/ Filter

13 HP* Kawasaki Electric Start

Make	Kawasaki
Model	FH381V
Oil Capacity	3.2 pt. (1.5L) w/ Filter

CHASSIS:

Fuel Tanks	Capacity: 4 Gallons (15.1 L)
Rear Wheels	Tire Size: 16 x 6.50 -12 Inflation Pressure: 15 psi (1,03 bar)
Front Wheels	Tire Size: 9 x 3.5 - 6 Inflation Pressure: 25 psi (1,72 bar)

BELTS AND BLADES:

32" Deck Model

Drive Belt	5023058
Deck Belt	5022918
Mower Blade	5020843

36" Deck Model

Drive Belt	5023058
Deck Belt	5049238
PTO Belt	5023262
Mower Blade	5021227

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